ONTARIO FIELD CROPS
RESEARCH AND SERVICES COMMITTEE

2003 ANNUAL REPORT

TO

ONTARIO AGRICULTURAL SERVICES
COORDINATING COMMITTEE

February 25, 2004

TABLE OF CONTENTS

Executive Summary..... 1

Mandate of Committee 7

Industry Sector Scan..... 8

Strategic Directions..... 36

Appendix..... 65

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EXECUTIVE SUMMARY

The Field Crop sector is a dynamic industry that continues to evolve and change. Cropping patterns are changing in response to changing economic pressures; new technologies are being introduced and adopted rapidly and producers are diverting energies to focus more clearly on consumers. The role of the Ontario Field Crops Research and Services Committee and its eight constituent subcommittees is to provide strategic recommendations for research and services for the Ontario field crop sector. It is our goal to improve the efficiency and competitiveness of crop production in Ontario such that this industry is positioned to be competitive on the world market.

The 2003 Report continues to support the strategic directions for the field crop sector established in 2001. Research and services priorities encompass 5 broad themes, which are: life sciences, food quality and safety, environmental sustainability, rural economic development and competitiveness. All priorities whether specific to commodities or disciplines address one or more of these themes. Specific research priorities and service priorities are grouped under the following headings:

Research Priorities

1. **Agronomic Systems and Environmental Stewardship.**
   Research leading to production systems and their components which enhance competitiveness, food quality and safety and environmental sustainability.

2. **Innovative and enhanced germplasm development and utilization.**
   This section will include crop breeding, performance evaluation, physiology and the development of new molecules, gene discovery, genomics, and bioinformatics to produce knowledge and materials to advance the industry.
3. **Market Responsiveness**
   Research strategies to address market development, new product development, food safety and enhancement.

Service Priorities

1. **Efficient and effective technology transfer.**
   Development and implementation of strategies to ensure the verification and uptake of appropriate technological advancements by the field crop sector.

Priorities are detailed in the section on Strategic Directions where specific research and service recommendations are chronicled. These recommendations represent the areas of research and technology transfer that FCRSC considers essential to the strengthening of the field crop industry in Ontario. Within each priority are commodity and pest management recommendations.

Activity is documented in each area, and rate of progress, industry needs and potential for success should dictate the shifting of resources within and across these priorities.

The 2003 report of the Ontario Field Crops Research and Services Committee also provides an overview of the status of the field crop sector in Ontario including the identification of current issues facing the industry.

Status of Ontario Field Crops

Over the last twenty years, corn, soybeans and forages (Fig. 1) have dominated acreage of field crops in Ontario. Recently, new wheat varieties and improved prices have shifted plantings away from corn and soybeans to winter cereals (Table 1). Winter wheat continues to be the dominant cereal crop. Favourable environmental conditions in 2002/2003 resulted in excellent wheat yields. Corn yields were also excellent throughout the province. The demand for Ontario corn is expected to increase when the planned new ethanol plants begin commercial production. Soybean yields were again below long-term averages as a result of delayed spring planting, aphids and mid-summer drought conditions. Yields were highly variable across the province. Low yields were most noticeable in the southwest and golden horseshoe regions of the province. Green soybean seed at harvest initially caused by early frost, caused dockage for some producers. This problem resulted in grade discounts, the downgrading of Identity Preserved soybeans, and difficulty meeting export obligations. Fifty thousand acres of canola were planted in 2003 (Table 1), with an average yield of 1755 lbs/acre. Swede Midge a relatively new pest caused considerable damage and concern to the industry. Alfalfa winter survival was acceptable. Forage yields were generally good although quality was reduced either by advanced maturity or rain damage. Concerns remain within the industry as they try to adjust to the influence of BSE on the cattle industry. Where there was adequate moisture, pastures and stored forage inventories are average throughout the provinces

Ontario farmers planted 55,000 acres of white beans in 2003, compared to 100,000 acres in 2002. Although white bean yields were excellent, the use of bin run seed and the lack of disease resistant cultivars resulted in reduced yields in certain areas of the province. Coloured bean acreage was 50,000 acres, down from a reported 75,000 acres in 2002. Tobacco production and total value in 2003 continued to decline by approximately 13%. The tobacco industry has lost more than 100 producers since 2001 because of diminishing crop size and industry uncertainties.

Weed control was generally good throughout the growing. The acceptance by growers of herbicide tolerant crops such as Round-up Ready soybeans continued to increase in 2003. Roundup Ready technology accounted for approximately 60% of the soybean acres, and 10 to 15% of Ontario corn acreage. Concerns were expressed by various commodity groups that the wide adoption of genetically modified crops may reduce our ability to maintain identity preservation. This may have important implications for established and new export markets. Insect and disease issues continued to be monitored throughout the province.

Farm gate values were available only from 2002 (Fig. 2). Based on last years data cereal crops were grown on 21% of the acreage seeded with field crops and produced 12.4% of the field crop farm gate value. Corn was grown on 25.3% of the acreage and produced 36.7% of the total farm gate value. Soybeans were grown on 23.8% of the acreage and produced 22.9% of the farm gate value. The total farm cash receipts for field crops grown in Canada in 2002 were approximately $36 billion for all sectors. Ontario's share of these cash receipts was 23.5% or $8.5 billion. The farm gate value from the field crop sector in Ontario is approximately $2.6 billion. This is in comparison to farm cash receipts of $1.4 billion from dairy, $2.9 billion from other livestock, $0.20 billion from commercial fruit crops, and $0.68 billion from commercial vegetables (including green house crops and mushrooms).

- Ontario field crops are a major source of exports although the province is a net importer. In 2002, $1.7 billion in grains and oilseeds products and animal feeds were exported and $1.8 billion imported. Exports account for approximately 85% of the white bean crop and 21% of the soybean crop annually. Although 4.7% of the corn crop is exported, Ontario is a net importer of corn. In order to maintain the viability of agriculture in Ontario the efficiency of production and the quality, safety and marketability of all field crops need to continually improve to enhance domestic markets and to compete globally. These are the primary goals of agricultural research.

In summary, emerging issues influencing the viability of field crop production in Ontario include:

- preservation of identity preserved GMO and non-GMO crops
- cropping systems
- expansion of international export market opportunities defining an Ontario Abrand@ identity
- climatic variation
- registration of pest management technologies
- development of bio-based industrial products from Ontario field crops
- service

Fig. 1 Field Crop Trends 1983 - 2003

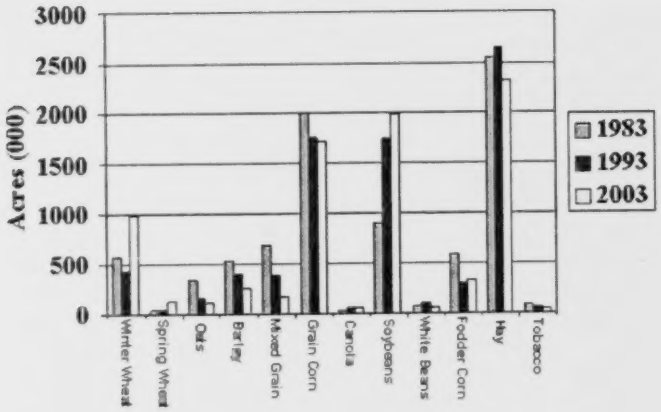


Fig. 2 Major Field Crops
Relative Farm Gate Value - 2002

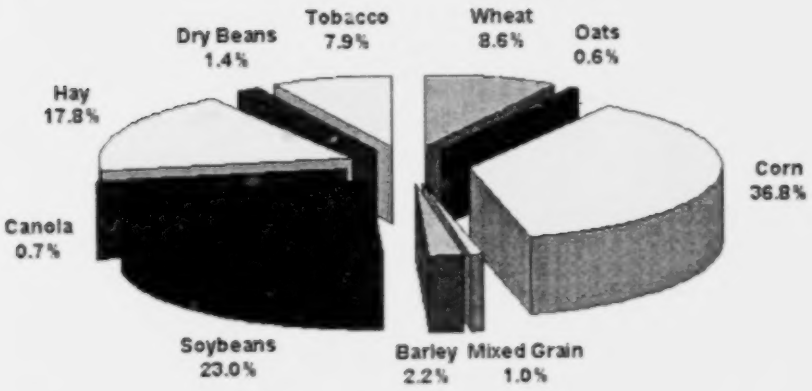


Table 1. Estimated Area, Production and Farm Value of Specified Field Crops, Ontario, 2001, 2002 and 2003.

Crop	Year	Units	Area		Production		Farm Value	
			Seeded	Harvested	Yield	Total	Per Unit	Total
			(acres)	(acres)	(units/acre)	('000 units)	($)	($'000)
Winter	2001	bu	545,000	540,000	71.9	38,800	3.76	145,800
Wheat[a]	2002	bu	580,000	580,000	72.1	41,800	4.19	175,100
	2003	bu	990,000	990,000	76.3	75,500	...	...
Spring	2001	bu	125,500	125,000	52.8	6,600	4.17	27,500
Wheat	2002	bu	170,000	170,000	50.6	8,600	5.66	48,700
	2003	bu	115,000	115,000	52.2	6,000	...	...
Fall Rye[a]	2001	bu	67,000	60,000	35.8	2,150	2.67	5,700
	2002	bu	70,000	60,000	31.3	1,875	3.20	6,000
	2003	bu	65,000	60,000	40.0	2,400	...	...
Buckwheat	2001	bu	6,000	4,000	35.0	140	...	...
	2002	bu	7,000	7,000	25.0	175	...	...
	2003	Bu	5,000	5,000	26.2	130	...	...
Oats	2001	bu	102,000	90,000	68.9	6,200	2.69	16,700
	2002	bu	115,000	100,000	67.0	6,700	2.49	16,700
	2003	bu	120,000	110,000	72.7	8,000	...	...
Barley	2001	bu	309,000	295,000	66.1	19,500	2.89	56,400
	2002	bu	335,000	320,000	56.9	18,200	3.09	56,200
	2003	bu	265,000	255,000	63.5	16,200	...	...
Mixed Grain	2001	bu	218,000	190,000	68.4	13,000	2.08	27,000
	2002	bu	210,000	190,000	62.1	11,800	2.25	26,600
	2003	bu	190,000	175,000	66.9	11,700	...	...
Grain Corn	2001	bu	2,000,000	1,960,000	103.1	202,000	3.44	694,900
	2002	bu	1,925,000	1,910,000	113.1	216,000	3.96	855,400
	2003	bu	1,800,000	1,725,000	127.0	219,000	...	...
Canola	2001	bu	36,500	35,000	39.4	1,380	6.01	8,300
	2002	bu	60,000	60,000	32.5	1,950	8.83	17,200
	2003	bu	50,000	50,000	36.0	1,800	...	...
Soybeans	2001	bu	2,250,000	2,225,000	21.1	47,000	7.31	344,000
	2002	bu	2,075,000	2,065,000	33.9	70,000	8.50	595,000
	2003	bu	2,000,000	1,990,000	31.9	63,500	...	...
Dry White	2001	cwt	58,500	50,000	13.1	655	27.48	18,000
Beans	2002	cwt	85,000	85,000	18.5	1,575	23.00	36,200
	2003	cwt	55,000	55,000	20.0	1,100	...	...
Coloured	2001	cwt	63,000	50,000	10.0	500	...	...
Beans	2002	cwt	75,000	75,000	16.0	1,200	...	...
	2003	cwt	50,000	50,000	21.0	1,050	...	...
Fodder Corn	2001	tons	320,000	310,000	10.6	3,300	23.30	76,900
	2002	tons	325,000	325,000	12.3	4,000	24.40	97,600
	2003	tons	325,000	320,000	14.4	4,600	...	...
Hay (b)	2001	tons	2,200,000	2,110,000	2.1	4,400	69.52	305,900
	2002	tons	2,500,000	2,350,000	2.2	5,150	89.44	460,600
	2003	tons	2,360,000	2,320,000	2.4	5,650	...	...
Tobacco	2001	lbs	56,500	56,500	2,100	117,094	2.29	267,683
Flue Cured	2002	lbs	44,300	44,300	2,450	108,060	1.81	195,800
	2003	lbs	...	...	...	...	...	...

[a] Area seeded represents area remaining as of June 1 (Source: OMAFRA Statistics)

MANDATE OF FIELD CROPS RESEARCH AND SERVICES COMMITTEE

The Ontario Field Crops Research and Services Committee and its constituent subcommittees are empowered to review and direct research and services leading to the improvement in crop production efficiencies and competitiveness of Ontario agriculture in world markets. Specifically the mandate of the committee is:

(a) To review reports submitted by Commodity and Pest Management-based subcommittees.

(b) To assess requirements for Field Crop Research and Services

(c) To establish priorities for Field Crop Research and Service programs

(d) To assess progress in Field Crop Research

(e) To develop and present reports and recommendations to the Ontario Agricultural Services Coordinating Committee describing the needs for Field Crop Research and Services including as appropriate information in relation to:

- (i) cost-benefit
- (ii) research facilities and personnel required
- (iii) location best suited for the investigation
- (iv) how funds might be obtained or freed to conduct new research or services
- (v) operation of crop committees

(f) To consider and approve Chairs and membership of each Crop Committee

(g) To appoint representatives to other OASCC Research and Services Committees when requested and to liaise with the Ontario Pest Management Research and Services Committee.

(h) To provide an inventory of the research effort in field crops

(i) To take a lead role in the documentation of Research Accomplishments and Proposed New Research Directions for ARIO program reviews on a 4-year basis.

INDUSTRY/SECTOR SCAN

Ontario Field Crop Research Coalition
Innovative Farmers of Ontario
Oat & Barley Council of Ontario
Ontario Canola Growers' Association
Ontario Coloured Bean Growers' Association
Ontario Corn Producers' Association
Ontario Forage Council
Ontario Soil & Crop Improvement Association
Ontario Soybean Growers
Ontario Wheat Producers' Marketing Board
Ontario White Bean Producers
Seed Corn Growers of Ontario

The following issues are of particular interest to the members of the Coalition:

Enhanced Genetics – The OFCRC's enhancing the genetic capacity and diversity of Ontario field crops study was completed earlier this year. A draft Vision for the genetic Enhancement – Ontario field crop sector has now been developed. Further input is being sought from field crop committee chairs, and leaders within OMAF IRMB, University of Guelph and AAFC. The draft vision discussion document calls for the establishment of a Field Crops Bio-economy Institute and Bio-Products Specialists. With respect to field crop variety performance testing, there are immediate concerns regarding corn and cereal testing in Eastern Ontario.

OMAF Services – Field crop producers in Ontario highly value the many valuable extension services provided by OMAF.

- The Southwest Ag Conference, CROPTALK, CROPPEST, and CROPLINE are excellent and timely approaches to sharing agronomic information. The OMAF website resources are becoming increasingly useful. Producers appreciate the support of these services and the commitment of those involved. However, the overwhelming demands on OMAF staff are apparent. The need for additional staff (and maintained resources for summer student assistance) remains a huge concern as opportunities are lost and the implementations of new technologies that reduce environmental impact are delayed.

- Field validation of promising research is an important OMAF role. Once technologies are proven to be useful and economic at the field and farm level, producers will be quick to adopt them. The need for independent, third-party data has never been greater. OMAF has a vital role in working cooperatively with farmers to evaluate new technologies and share the results. Continued cooperation is vital for Ontario agriculture to excel in this competitive global industry.

- OMAF continues to play a key role in the annual evaluation of field crop varieties in Ontario. OMAF could further assist the field crop sector in capitalizing on "bio-products" opportunities by establishing "Bio-Product Specialist" lead positions to operate out of the University of Guelph main or satellite campuses (with adequate technical help).

- Weather data can be vital to optimal crop management. For example, the Ontario Weather Network's rain/temperature-based Fusarium forecasts improve the likelihood of effectiveness of Folicur application in wheat. Recognizing the weather data can be costly, a balance in these services and the resulting value must be found.

- Concerns remain regarding low producer awareness of pending nutrient management regulations. Producers need to be updated on the status of the regulations and the management recommendations that are now available. More research is necessary to develop science-based solution where there are currently voids.

- OMAF's role in seeking emergency-use pesticide registrations is valued.

Research funding reductions – The Coalition remains concerned with the continued pressure on field crop research programs.

ARIO Strategic Review – The OFCRC plans to actively participate in the Agricultural Research Institute of Ontario's Strategic Review.

CEREALS

State of the Industry

Performance Testing - A strong performance testing system is the most efficient method of determining the value of new genetics. The evaluation of special traits and increased yield potential of new varieties is a must for a strong agricultural sector. The identification of better yielding and area specific cereal varieties gives Ontario growers a competitive advantage to other regions that do not have a well designed performance testing system.
Cereal crops depend not only on quantity, but also on quality analysis to give Ontario a more competitive milling and baking industry. As well, quality analysis is still a large component in the registration requirements for cereal crops, especially wheat.

OCCC is specifically concerned with the loss of testing in the Kemptville area, and is overall concerned with the future loss of any testing avenue.

Reducing Risk - There is an ongoing issue of reducing/controlling risk in cereal crops. The research into such factors as fusarium, dwarf bunt, winterkill, sprouting, and rust to name a few can cause great economic loss to our sector of the industry. Both quantity and quality can greatly be affected when cereal crops become infected with disease due to cereal management

techniques and weather variables. Production strategies are needed to overcome or manage these risk factors, as they have a huge impact on the stability of the industry.

Extension - There is an ongoing concern for the lack of qualified people to do basic research in the disease, quality and environmental aspect of cereal crops. The need of basic research is always ongoing tin the areas of disease, production and new market potentials. We also need extension personnel to get this information to the growers and to industry in a timely manner with a hands-on-approach.

Cereal Breeding - Breeding in the province continues to be a backbone of advancements made within the cereal industry, it remain one of the top priorities of OCCC.
Genetic improvement of cereal crops is a tremendous benefit to Ontario agriculture. There is considerable effort underway in the private sector to develop new varieties, namely winter wheat. Public fund should be directed in areas and other crops where private breeding efforts are not evident or likely to occur (i.e. oat & barley breeding). Linkages and cooperative efforts are occurring between organizations to make the industry stronger, as are seen with the fusarium testing efforts with Hylands Seeds and AAFC.

New Market - Development of new markets is a way to expand the acreage and value of crops grown. Milling oat and malt barley are two such areas underway within the cereal crop sector. It has the potential to expand the acres for both oats and barley across the province, while other opportunities either exist or are yet to be discovered that have the potential to strengthen the industry even more.

CORN

State of the Industry

Production
Grain corn acreage in Ontario held relatively steady in 2004, but yields increased significantly over the past three years, all of which had been below the previous five year average (Table 1).

Production was limited most seriously in 2003 by poor weather conditions during planting and harvesting. Growing conditions from June 1 to September 30 were actually quite favourable. Nearly all parts of the province had excellent pollination and the potential for above average yields was evident in early August. Late planting, below average temperatures in July, and late silking resulted in grain filling being delayed significantly.

A reduced number of suitable harvest days, high harvest grain moistures, low test weights and massive crop lodging contributed to making the 2003 harvest the most difficult since 1992. Corn acreage predictions for 2004 are 1.9 million acres.

Table 1. Grain corn acreage, production and value statistics for Ontario, 1991-2004.

YEAR	AREA (ac) (Million)	YIELD (Bu/ac)	PRODUCTION (Million Bu)	SVALUE (Million)
2004/05[1]	1.9	115	219	732
2003/04[1]	1.7	127	216	702
2002/03	1.9	113	215	842
2001/02	1.9	102	194	684
2000/01	1.7	105	179	576
1999/00	1.8	128	230	654
1998/99	1.9	129	238	702
1997/98	1.8	115	207	800
1996/97	1.8	108	188	838
1995/96	1.7	117	202	929
1994/95	1.6	121	193	619
1993/94	1.7	108	180	602
1992/93	1.4	97	136	371
1991/92	1.9	111	209	558

1 Forecast

Grain Corn Supply and Demand

Since 1999 the most dramatic increases in grain corn use has been on the industrial side (Table 2). This demand has levelled off recently but the industry is anticipating increased demand if, and when, proposed new ethanol plants are constructed within the province. These proposed new plants or expansions are: Commercial Alcohols, Chatham (expansion), Integrated Grain Processors, Brantford (new) and Seaway Valley, Cornwall (new). The industry will be paying particular attention to the effect that Kyoto agreements or other government initiatives may have on biofuel usage and production.

Table 2. Grain corn production, imports and usage in Ontario (million bushels).

	2004/05[1]	2003/04[1]	2002/03	2001/02	2000/01	1995-1999 (average)
Ontario Production	219	229	216	197	177	213
Ontario Imports	25	30	52	57	70	16
Feed Use	152	154	175	162	155	142
Industrial Use	80	84	84	83	82	63

1 Forecast

SIGNIFICANT RESEARCH/SERVICE ACCOMPLISHMENTS

Corn Hybrid Development and Evaluation

Private sector development and evaluation of corn hybrids for Ontario continues to be very active. Seed company support for and participation within the OCC hybrid performance trials was strong in 2003. The 2003 Performance Report was made available to the industry in excellent time this year especially considering the delays in harvest.

Kemptville College continued to play an important role in the OCC performance testing and conducted three excellent trials in the east. The OCC is anxious to see a more permanent resolution to testing arrangements in the Ottawa Valley.

Hybrids with genetically modified traits made up a significant portion of the market in 2003. Bt hybrids are estimated as having been grown on 44 % of Ontario's corn acreage while Round Up tolerant hybrids approached 10 % of the provincial market. The Ontario Corn Committee has discussed in some detail the concerns over testing herbicide tolerant hybrids in separate performance trials in order to allow hybrid–specific herbicides to be used. OCC and OMAF initiated and co-funded with other industry partners a research project to evaluate herbicide impacts on hybrids under conditions that would mimic performance testing. Essentially these conditions are that the plots be kept weed free throughout the entire season and that herbicides are applied at precisely the correct growth stages of the crop. This research was contracted to Dr. C. Swanton and Dr. P. Sikkema of the University of Guelph. Preliminary results in 2003 indicated to the OCC that conventional soil applied herbicides in well-managed performance trials applied to herbicide tolerant hybrids (Roundup Ready or Liberty Link) would not disadvantage these hybrids compared to a herbicide tolerant system. These trials will be conducted again in 2004.

Emerging Needs and Issues

The OCC struck a sub-committee in November 2003 to examine the potential for establishing output trait performance testing. Members of the committee are pursuing testing protocols, output traits of significance, and potential clients for this sort of testing. The following represents a list of some of the potential output traits that could be immediately considered for this sort of initiative: high amylose, oil, starch, lysine etc.

OILSEEDS

State of the Industry – Soybeans

- Soybean acreage was approximately 2.0 million acres in 2003, which was essentially equal to 2002.

- For the third year in a row, provincial yields were significantly lower than the long-term averages. With the majority of fields reported the provincial average for 2003 is approximately 30.79 bu/ac. This is down from a long-term AFY (average farm yield) of about 39. Yields were extremely variable across the province, with some fields yielding only 8 bu/ac while other regions achieved yields in excess of 55 bu/ac. Some of the hardest hit counties were in the southwest and golden horseshoe regions of the province:
  1. Elgin – 28 bu/ac
  2. Middlesex – 26 bu/ac
  3. Lambton – 25 bu/ac
  4. Essex – 31
  5. Chatham-Kent 32 bu/ac
  6. Haldimand – 22 bu/ac
  7. Peel – 24 bu/ac

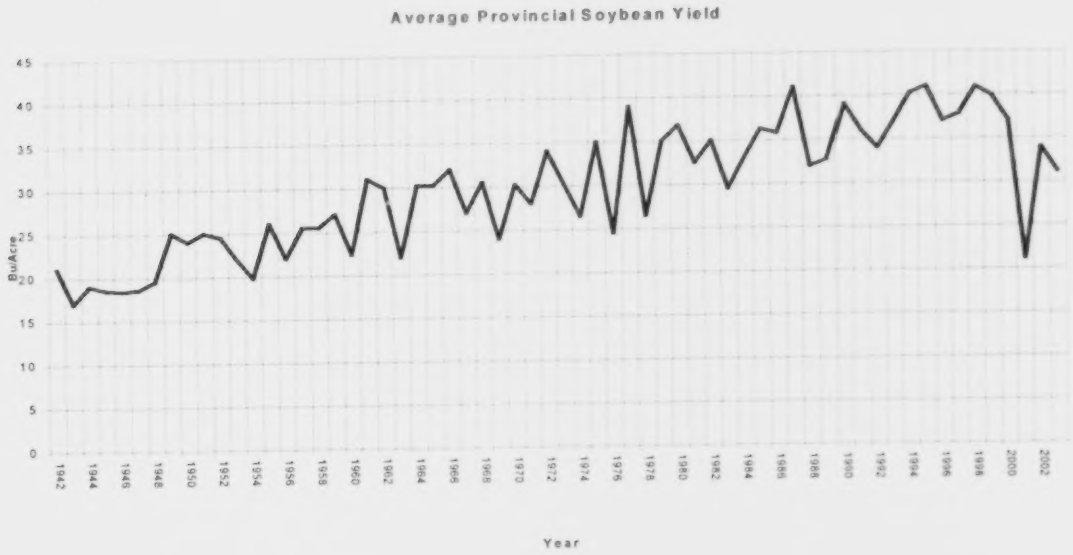
- Regions within Huron, Perth and the eastern part of the province had excellent yields.
  1. Perth – 42 bu/ac
  2. Renfrew – 42 bu/ac
  3. Ottawa – 40 bu/ac
  4. Stor, Dun&Glen'y – 42 bu/ac
  5. Prescott & Russel - 44 bu/ac

- Low yields right across much of the US mid-west pushed prices to a 5 year high (>$10.00/bu) These higher prices meant excellent returns for producers with good yields. Crop Insurance payouts (floating rate) were also relatively high ($9.16/bu)

- These higher prices along with fewer than anticipated winter wheat acres being planting this fall will probably lead to average soybean acreage in 2004.

- Why were yields so low?
  - -A wet spring delayed planting with some regions not completing seeding until mid June
  - -Dry weather in August and September
  - -Soybean Aphids
  - -Fewer CHU (crop heat units) than average
  - -Cool nights during flowering
  - -Higher incidence of white mould and SCN than average

- What took many by surprise is that fields appearing to have a 40+ bu/ac potential in August actually only yielded 30 bu/ac or less. Soybean fields can be extremely deceptive in appearance with respect to final yield.



- An emergence registration was granted by PMRA for soybean aphids for the product "Matador"

- Dry conditions and aphid pressure resulted in extremely small soybean seed size this year accounting for some of the low yields.

- Soybean aphid populations were generally low until about mid-August. At this time populations increased rapidly and aphids could be found right across the entire province. Populations were the highest along lake Huron and in the southwest. (Essex, Chatham-Kent, Lampton, Elgin, and Middlesex) Yield impact due to aphids was most apparent where plants were already moisture or disease stressed. Field scale strip trial data from this year shows yield benefits from 0 – 18 bu/ac. Soybean aphids are still a relatively new pest and look as though they will be a complex problem. Thresholds appear to be dependent on a number of factors including the plant stage at infestation, the stress of the plant during infestation, the soybean variety, etc. Seed size was also dramatically reduced in cases where soybean plants were moisture stressed. In some cases affected seeds were only 80% of the size of unaffected seeds.

- In some later planted fields (especially in the Niagara region) fall frost caused considerable damage. The seed inside the pod was still green (R6 growth stage) at the time of frost. Since

•the seed inside the pod was still green at the time of the killing frost (<-2°C) these immature beans took on a glassy wax-like appearance. Much of this seed did not mature normally and retained a green colour even as the seed dried down. Beans with a greenish colour and wrinkled seedcoat are considered damaged soybeans and are discounted.

- Identity Preserved (IP) soybeans have been a key component of Ontario's soybean industry. Demand for specialty food grade soybeans and non-GM soybeans continues to grow. Ontario has had a strong reputation for top quality soybeans. This, along with Ontario's ability to segregate these beans efficiently, has produced a strong provincial IP industry. However, lower quality and low yields have caused considerable difficulties over the last three years. Quality in 2001 was very poor due to drought and insect damage. Many exporters could not meet their export obligations. In 2002 'green soybeans' caused the downgrading of a large percentage of IP soybeans. Although quality was generally better this year than in 2001 and 2002 small soybeans due to moisture stress and aphid damage have caused considerable concern in the industry.

- Premiums for IP soybeans enticed many growers to that market. However, over the last three years quality problems resulted in many farmers not meeting premium requirements. This year seed size was one of the major problems faced by producers. This, along with the lower yields associated with IP soybean varieties, has resulted in widespread disappointment for IP soybean growers again in 2003. Higher prices actually put even more downward pressure on the IP system since IP premiums do not increase in proportion to the crush price. Combine capacity is reduced with limited harvest hours and the threat of contamination (i.e. changing from corn to beans or non-GM beans to GM beans as weather allows). IP soybean acres are expected to decline further in 2004.

- The adoption of Glyphosate Resistant (GR) soybeans across the province has been rapid. In 2001 approximately 30-35% of the crop was GR. In 2003 approximately 55% of the crop was GR. This number is expected to increase by another 5-15% next year. Weed control problems with conventional varieties, improved GR varieties, quality, yield, and premium issues with the IP sector have driven this increase. The convenient fit of GR soybeans into a reduced tillage system is another reason for this rapid expansion in RR acres.

- In those parts of the province where yields have been low for several years no-till production is being blamed for some of the decrease. Some producers have reported that conventionally tilled soybeans yielded more this year than no-till fields. This has lead to more fall tillage this year and may lead to an increase in the percentage of conventionally tilled soybean fields in 2004. Long-term research indicates that no-till and conventional till fields yield the same on average.

- The soybean variety registration process continues to be under review. Last year the proposal was that soybeans would fall under Schedule B – registration without merit

requirements but requiring one year of performance data. However in the new proposed variety registration system, soybeans will fall under Schedule 'C'. This will mean the loss of merit requirements as well as performance data requirements for registration. With these reduced standards, even more emphasis will need to be placed on generating data which allows producers to make profitable variety decisions.

- The OSV (Ontario Soybean Variety) trials were divided into RR (Roundup Ready) and conventional herbicide trials for the first time in 2003. Results are now reported on separate tables in the brochure.

- The OOPSCC website www.oopscc.org is now fully operational. Sponsors enter required data on the web, which significantly improves efficiency over the paper system. The data is also available on the web site for producers.

- A strong performance testing system is key to the continued success of the soybean industry in Ontario. With the development of new traits through biotechnology, this performance data is critical in evaluating the potential of new varieties.

- Soybean pests continue to cause considerable damage to Ontario production.
    1. During the first week of August, 300 commercial fields across Ontario were tested for various soybean viruses. 16 samples tested positive for Bean Pod Mottle Virus (BPMV) and 15 tested positive for Soybean Mosaic Virus (SMV)
    2. This was one of the worst years for white mould in recent memory.
    3. SCN (Soybean Cyst Nematode) symptoms were more evident this year than in the past 4-5 years. SCN has been positively identified as far east as Peel county. The U of G along with commercial seed companies are now incorporating Cyst-X technology into some of their lines which will be a new line of SCN resistance.
    4. A survey of Phytophthora Root Rot in eastern Ontario and Quebec has shown that a large percentage of the Phytopthora in that region is a strain that will not be easily controlled by most of the present phytophthora resistant varieties.

State of the Industry – Canola

- Ontario farmers planted an estimated 40-55 000 acres of spring canola with an average yield of 1625 lbs/acre. The long term AFY (Average Farm Yield) is 1755 lbs/acre.

- There was considerable concern in the industry when CanAmera in Hamilton stated that it would no longer accept canola into their crushing facility. Leaving ADM in Windsor as the only crusher accepting canola in Ontario. This fall CanAmera reversed it's decision and said they would be accepting canola in 2004 and would review that decision on a yearly basis.

- Ontario Canola Growers imported and planted an estimated 4000 acres of European hybrid (Kronos). In Ontario performance trials this hybrid yielded 20-30% higher than the check varieties.

- Cabbage Seedpod Weevil caused considerable damage in the winter canola crop this spring as well as being present in some spring canola fields. Control measures will probably be necessary each year in the winter canola crop.

- Swede Midge is a relatively new pest that is causing concern in the industry.

- 75% of Ontario's canola crop is Roundup Ready (RR) leading to potential weed resistance problems as well as the problem of controlling volunteer canola in following crops. There is also concern with cross-pollination between non-GMO and GM crops.

- There is a need for more research into production parameters. Seeding rates, row width, and N requirements needed to reach optimal yields need to be researched.

- Producing non-GM seed is an issue -- again the threat of cross-pollination. As a result this seed is grown in isolated areas.

Emerging Needs and Issues

1) Continued strong support of genetic enhancement for production stability and risk management. Continued support of public soybean breeding programs is essential to ensure new varieties suited for Ontario's unique climate are bred.

2001, 2002 and 2003 saw reductions in soybean productivity in Ontario due to extreme weather and pest infestations. These reductions have cost Ontario significant financial losses. Plant breeding will help reduce such declines in productivity and re-establish an upward trend in soybean productivity. The last three years have demonstrated that breeding must not only focus on high yielding varieties but most also focus on pest management.

2) Performance Testing of Soybeans and Canola. Reliable third party performance data is vital information to Ontario farmers. Strong support of performance testing by all levels is recommended.

3) Plant Genomics. Current support of agricultural plant genomics is low in Ontario and needs improvement. The science of Genomics is the study of the activity of many genes in time and space. The information generated from genomics will be available to scientists studying individual genes or processes. Genomics funding needs to be broad based and come from both the provincial and federal levels.

4) Best Management Practices concerning new and emerging pests such as soybean aphids and soybean rust must be established as quickly as possible. Lower production over the last number of years in soybeans has been largely due to pests.

FORAGES

State of the Industry

Alfalfa winter survival was generally good, despite extensive harvesting during the 2002 Critical Fall Harvest Period. Some winterkill was experienced in the east and north-west, particularly on poorly drained fields, and with new seedings on the heavier soil types. Winter survival of summer seedings was poor where dry conditions reduced or delayed emergence going into the fall. Early spring seedings were generally successful.

Cool, wet spring weather delayed forage growth considerably. The cool weather slowed the growth and development of the legumes much more than the grasses. This resulted in mixed stands with a high proportion of grasses, as well the grasses being more mature relative to the legumes. Alfalfa fibre levels were higher than normal based on stage of development.

Early first-cut harvest was delayed in many areas due to frequent rainfall. Yields were good, but forage quality was reduced, either by advanced maturity or rain-damage. Considerable amounts of hay were treated with propionic acid or wrapped as baleage. Very little dry hay was made without rain damage or mould until mid-June. Laboratory analysis of first-cut indicated many samples with higher than normal NDF and lower CP levels, but with close to normal NDFD (fibre digestibility).

Some alfalfa weevil was reported at threshold levels in the south-west, but limited spraying was required. Potato leafhopper levels were extremely high across the province, particularly in the Lake Erie area. Damage to new seedings and second-cut re-growth was extensive in some areas. While producer awareness of this damaging insect pest is increasing, further management is required.

Moisture conditions at the time of summer seedings were good in most areas of the province. However, drier weather soon followed in mid-August and early September, which delayed emergence and reduced establishment.

Pasture production was very good for most of the season. The cool spring delayed early development. Where cattle were turned out according to the calendar rather than the development of the pasture, some damage was done. Adequate rainfall supported good early summer pasture growth. Dry conditions in late August and early September slowed pasture growth. Rotationally grazed pastures were more productive than continuously grazed pastures, particularly through the "summer slump" period. Some grazing of corn stalks was done after harvest.

Corn silage yields were generally adequate. Despite the potential for immature corn silage, frosts did not occur until the first week of October. After frost moistures dropped quickly, and some corn silage was harvested at moisture levels that were too low. Corn silage forage quality was variable. Fields with lower grain yields, and silage that was poorly packed was of poorer forage quality. Extra corn silage was made in some situations to compensate for higher livestock inventories. Some harvest was done immediately after the Critical Fall Harvest Period, when field conditions were good, in order to increase forage inventories.

With adequate moisture, pastures and stored forage yields have been good and forage inventories appear to be at least average in most parts of the province. The exceptions to this are mainly in parts of northern Ontario (Rainy River, Algoma, Temiskaming and Cochrane Districts) where inventories are limited.

The BSE situation created a producer dilemma with regards to forage inventories. In the short term, feedlots holding cattle from the market required extra feed. In the longer term, feedlots reducing fall stocker cattle purchases, required reduced levels of forage inventories. On the other hand, cow-calf producers and backgrounders that held cattle that they normally would have sold have increased requirements for forage inventories and te:nporary storage.

Significant Research/Service Accomplishments

Technology transfer was discussed in both the Variety and the Production committee meetings. The variety committee felt that a commendable job was being done in getting variety information out to the producers. Currently 40,000 brochures are printed and circulated to each of the commodity publications in dairy, sheep and beef and it is reprinted in Farmer's Forum. In addition companies have a full supply of brochures and the brochure information is available on the Internet OFCC site. The variety committee is also exploring the possibility of putting individual station results on an additional Internet site.

The Production committee also felt that technology transfer was adequate, however this committee expressed the grave concern that there is very little technical information to be transferred. *With the decline in resources devoted to forages the concern is not the transfer of information, but the lack of information to be transferred.*
The OFCC instituted a new fee schedule, which continues to be well accepted by the seed industry. For seed companies simply wishing to have their results in the brochure a membership has its benefits has been undertaken. The membership fee is $1,750.00 per year and the benefit is inclusion in 40,000 copies of the brochure and in media print of the brochure as well as being posted on the Internet. Since the committee is in a relatively good position companies are encouraged to pay early by April 30 for a reduction to $1,500.00 Twelve companies have paid the membership to date and so the brochure is being printed and circulated. Companies not wishing to be in the brochure may have their varieties tested without the need to be a member.

Variety Concerns

The OFCC has steadfastly supported the position of farmers in the province to maintain performance testing in the province and also supports performance testing for the registration of forages. In terms of variety registration the variety office of CFIA has yet to make a definitive statement on it's position as to whether forages should be in schedule "B" that is performance testing required or in schedule "C", performance testing not required for registration. The OFCC has urged both the Expert Committee on forages and CFIA to support evidence of performance requirements. The OFCC has requested that reed canary grass be placed in schedule "A"

because of concerns regarding alkaloids in Ontario. CFIA variety office has turned down this request in the interests of a uniform national policy.

FIELD CROP PROTECTION

State of the Industry and Significant Research/Service Accomplishments

Corn

Corn leaf diseases and Corn flea beetle/Stewart's Wilt
Disease survey indicated that corn seedlings were frequently infected with Fusarium and Pythium. Late season survey found Northern leaf blight, eye spot were not that common and stalk rots were not as bad this year.
- Corn flea beetle levels were low - looking at prediction models to validate for Ontario
  -modifying to include soil temps
  -20 weather stations were set up last year
  -3 year of commercial corn survey - anthracnose, leaf blight and northern leaf blight were higher, ear rots and stalk rots were up as well

Corn Rootworm and Variant - beetle emergence in non corn crops (corn following soys or wheat) was observed - but was not considered an economical threat
- 11 monitoring sites were established in eastern Ontario

Poncho Seed treatment - Bayer has the active ingredient registered but now has a 45 day waiting period to get Gustafson label together
- Yieldguard controlling corn root worm--.very effective compared to other insecticides
- concern was expressed about the use these products in areas where it is not needed
- Stacking of resistance for corn root worm European corn beetle expected in new varieties concern that other insects won't be covered

True armyworm – Lab and field bioassay Mon 810 YIELDGARD ECB worked very well against True Armyworm. Herculex (Cry 1-F) is not as effective.

Black cutworm - In Ontario it is mostly 3rd or larger instars that are damaging corn. Earlier instars get their start on weeds. In lab bioassays 3rd instars are not killed by Herculex (Cry 1-F) when force fed. In the field 3rd and larger instars are repelled by CRY 1-F. PONCHO at the high rate kills 60% of the larvae in lab bioassay, but this rate did not sufficiently control the 3rd or greater instars in the field.

Wireworm– PONCHO at the low rate controls wireworm exceptionally well. It makes a great replacement for LINDANE

European Chafer - Decision thresholds for corn and wheat of about 1-2 larvae /sq ft. Have a sequential sampling plan worked out and critical sampling areas. Should take a grower approximately 1/2 hour to sample a field. PONCHO worked well in corn but not in wheat.

Fusarium - could be an issue this year given that corn has lodged from the wind storm and harvest is very late
- T2 toxin (fusarium sporatrichiodese) is produced in these conditions which is 10x more toxic - is on the ground and can get picked up - not sure how it develops and what its temperature limits are. - only an issue for corn that is touching the ground

Soybeans

Soybean aphids - Survey conducted again this year in 18 counties (6 fields per county) the first and second week of August at R1 to R2. Aphids were low to moderate in numbers in most fields at that time. Shortly after the survey, populations increased to threshold numbers but crop was past the stage of concern (at least in terms of what research showed would give a yield response). Spray trials did take place and some did show yield response even as late as R5. Thresholds will be revisited at a meeting taking place in December with all states and provinces data since 2000 being reviewed. Ontario Ag business will also be invited to a meeting following the threshold meeting to discuss Ontario's strategy for dealing with this issue next year.
Biocontrol - collaborative work with AAFC- weekly sweep and plant samples were taken at four locations again this year. Aphid numbers were monitored as well as all predators, parasites and pathogens recorded. Minute Pirate bug and syrphid fly larvae continue to be the dominate predators present at all times, with the multicoloured Asian ladybug moving in late in the summer when aphids populations increase.

- Found a very effective parasitic wasp in our colony in the greenhouse, working on developing an augmentative release program.

Multicoloured Asian Ladybird beetle - grape growers are concerned that soybeans are increasing ladybug populations
- research is required to elucidate the interaction with soybeans/grapes and ladybug thresholds

Soybean viruses
- the third year of the soybean virus survey was conducted in over 400 commercial and nursery fields in Ontario. These fields included the 108 fields used in the SBA survey. Soybean leaf samples were tested for Alfalfa mosaic (AMV), Bean pod mottle (BPMV), Soybean mosaic (SMV) and Tobacco ringspot (TRSV) viruses. Of the commercial fields tested, 17 were found infected with AMV, 15 with BPMV, 15 with SMV and 19 with TRSV. The number of positive commercial fields was higher than in previous years with the exception of BPMV. Due to the high incidence of insects, 16 commercial fields that tested negative for BPMV were re-sampled and 11 of these fields were positive (69% increase) for BPMV. This suggests that time of sampling is very important and could impact future management.

Phytophthora root rot - to increase grower awareness on the impact of these soybean diseases…see website www.planthealth.com which includes 12 US states plus Ontario

- characterize races in geographical area in terms of durability of resistance etc
-Ohio State University has released new germplasm that will be incorporated into Ontario lines, however, in eastern Ontario and Quebec 5-to-20% of phytopthora isolates were not controlled by the resistance gene
- pythium is showing up as having more significance in yield than first anticipated

Soybean Cyst Nematode
- Soybean Cyst nematodes continued to expand throughout a wider geographic area within the province in 2003.

White mold resistance
- fungal resistance is being studied
- crop rotation work to develop cropping recommendations for sclerotina are being developed to refine the cropping sequences to reduce this disease
- surveys are indicating that environmental conditions may select for certain populations of white mold

Cereals

Fusarium - Folicur registration - major concern
- now that wheat has become a profitable crop in the last three years there is more concern about what can influence this crop
- tram lines in wheat is being talked about to use the same lines for all fungicide, herbicide applications - wheat management has become important

- with the changes in the board, producers seeing their profit at the end of the season now instead of 18 months down the road which changes the mind set and increased the growth of wheat
- DONCAST has been revised to include coefficients for variety and crop history. A beta version is being tested for release to individual producers this coming season.

Dwarf Bunt
Strip trials were conducted on farm fields to compare effectiveness of fungicide treatments and rates, screen and identify tolerance in wheat varieties and to monitor disease development. Dividend out performed Vitaflo , 167 winter wheat varieties collected from all over north America were collected and screened. Resistance was identified in several lines

European Chafer
- seed treatments in wheat don not work as well as in corn
- no management strategy available yet
- may need to look at treating the soybeans prior to wheat planting to see if it controls newly hatching larvae

Wheat Disease survey

Spring wheat - septoria and leaf blotch have increased, common root rot was found in many samples

Winter wheat - fusarium came up in 40 to 90% of the samples

Forages

Root Rots

- root rots were found to be increasing

Edible beans

Angular leaf spot – Angular leaf spot was identified as a new disease on snap beans in Ontario

Canola

Swede midge

- a prediction model needs to be developed as well as a screen for potential resistance within germplasm
- plots protected by insecticides showed significant difference in number of branches and therefore pods compared with plants that were unprotected. These plots were under very heavy infestations and were infested at a very young plant stage (plots planted slightly later than normal canola planting time).

Screening for resistance - 17 lines having low damage ratings with 5 lines looking the most promising - will concentrate on these lines to get resistance into canola

Commercial canola fields surveyed . Injury indicative of swede midge was found at 6 sites. Five of the sites were commercial fields and were planted early. Plants at a later stage when first infested (after bolting) and did not show as much injury. Plants overcompensated by producing all of the pods at one location making a bouquet formation. The 6th site was planted much later for research purposes and did still contain larvae. Larvae were collected by CFIA to confirm identification. These plants showed the similar injury. Severity on canola will be dependant on timing of infestation, planting time and population level. Rotation out of crucifer crops for more than 2 years will be key in keeping this pest under control.

Cabbage seedpod weevil - in collaboration with Peter Mason AAFC in Ottawa continued survey for third year in a row. CSPW range has increased to all canola growing areas of Ontario and Quebec. Populations did increase to above thresholds and yield was reduced, especially in winter canola which was infested by overwintering populations. Research into validating thresholds, spray timing and biocontrol options is necessary.

PEST MANAGEMENT – ONTARIO WEED COMMITTEE

STATE OF THE INDUSTRY

In general, weed control with herbicides was good in 2003. Soil applied herbicides worked very well in all field crops, as moisture was adequate early on. Post-emergent herbicide programs also worked well, as weed growth was adequate during application. The fields planted to glyphosate resistant soybeans were particularly weed free compared to those treated with conventional herbicide programs.

Weed Control Results and Overall Crop Report

Weed control was generally good this year. Soil applied herbicides worked very well in all field crops, as moisture was adequate for the first 4-6 weeks after planting. Post-emergent herbicide programs also worked well, as weed growth was adequate during application. There was a significant increase in acres planted to glyphosate tolerant soybean and corn and therefore a number of acres saw postemergent applications of glyphosate.

Many no-till soybean growers opted to apply their first glyphosate application after the beans were planted as extremely wet conditions in the spring made timing of the pre-plant burndown difficult. As a result many fields received a glyphosate application as the beans emerged with weed populations at 10-15 cm in height. That timing issue, along with soybean aphid, soybean cyst nematodes, extremely dry weather in some areas of the province during August, lead to a below average provincial yield. However, areas of the province without water and pest pressures had normal to above average yields.

Corn yields were normal to above average this year, as moisture was adequate during silking. However an extremely cool and slow start to the spring, coupled with a very wet fall resulted in delayed hybrid maturity and high grain moisture content. This resulted in growers incurring significant drying costs. Weed control in field corn was generally excellent.

There was a record 1 million acres of winter wheat in Ontario and yields for the most part were tremendous, commodity prices were strong and quality was excellent. Unfortunately a late and wet 2003 fall hindered many growers from getting their intended wheat acres in. Although wet weather in the spring delayed winter wheat herbicide applications, there did not appear to be a significant influence on yield.

Trends

- Although post-emergent herbicide applications continue to increase in soybeans, there was a slight shift back to pre-emergent herbicide use in corn, due in part to favourable environmental conditions and growers trying to achieve earlier weed control.
- Low drift nozzles continue to be widely used by both grower and custom applicators.
- The use of GM field crops has continued to increase in 2003, mainly due to frustrations of poor weed control, particularly in soybeans. Roundup Ready (RR) soybean varieties are grown on about 60% of all soybean acres, and acreage has increased by about 10% over last year. RR corn continues to gain market share slowly as more seed companies develop new varieties across a number of heat unit ranges. The grain channeling issue with RR corn has perhaps been the biggest reason why more acres have not been grown. A conservative estimate would say that 10-15% of Ontario's corn acres were planted to RR corn in 2003. RR canola accounts for about 50% of the market share, however growers have had issues with volunteer canola in winter wheat.
- The market for Identity Preserved (IP) crops has softened, with lower premiums being offered, due to more competition from growers in the USA.

Problem Weeds

The University of Guelph (Guelph and Ridgetown campuses) continues to do a number of herbicide trials on problematic weeds including:

- nipplewort (*Lapsana communis*)
- flixweed *(Descurainia sophia*)
- wirestem muhly (*Muhlenbergia frondosa*)
- bur cucumber (*Sicyos angulatus*)
- spreading atriplex (*Atriplex patula*)
- prickly lettuce (*Lactuca scariola*)

Field crop growers and agronomists have expressed concern with an increase in the prevalence of white cockle (*Silene alba*), Scentless chamomile (*Matricaria perforata*), dog strangling vine (*Cynanchum rossicum*) and Cleavers (*Galium aparine*). Waterhemp (*Amaranthus rudis*) was found for the first time in 2002, and in 2003 another field location was found in Bruce County. Susan Weaver and Peter Sikkema have begun work to better understand the biology and control of water hemp. Dandelions continue to be a significant issue in the spring, specifically when not dealt with the previous fall.

Herbicide Resistance

Testing: Samples of red root and green pigweed, common ragweed, and lambs-quarters were sent into the University of Guelph this year as it was presumed that they were resistant to Group II herbicides. These samples are currently being tested by François Tardif, University of Guelph.
Concerns: There has been no incidence of any glyphosate resistant weeds at this time although

weed scientists, growers, extension and agronomists continue to scout for any "odd" performance issues. There is awareness of the risk of resistance among farmers, especially with widespread use of glyphosate, and wider adoption of recommended resistance management techniques. The Ontario Weeds Committee has put together a sub-committee to discuss and provide management guidelines for the responsible use of glyphosate. The issues undertaken by this sub-committee will range from weed resistance prevention to maximizing glyphosate performance.

Ontario's Weed Control Act

Two weed inspectors meetings were held in April and the attendance was excellent. The focus of the meetings focused on drafting local by-laws to enforce weed related issues in urban areas whereby the Weed Control Act legally doesn't apply.

Minor Use Program for Herbicides

Jim Chaput is the OMAF Minor Use Coordinator, located in Guelph, who maintains a website with updated information on Minor Use Proposals at http://www.gov.on.ca/OMAFRA/english/crops/minoruse/index.html . Currently there are 97 active minor use requests for herbicides of interest to Ontario growers. 12 herbicides were registered through the MUPP program this year that have been included in the 2004-2005 Publication 75.

Extension Activities at OMAF, Crop Technology

The new organization of extension services across Ontario has now been in place for the 3rd season. Currently OMAF has 2 provincial weed management specialists, one for field crops and one for horticultural crops. OMAF also has engineering specialists in application technology, and crop specialists for each crop who handle all aspects of production, including weed management.

- The 2004-2005 Guide to Weed Control (Pub 75) was revised by the Ontario Weed Committee on November 5 and will be available on February 1st. New product registration occurring in-season (April to July) will be posted on the OMAF Web Site. Most of the information from this publication is online at http://www.gov.on.ca/OMAFRA/english/crops/pub75/pub75toc.htm
- Ontario Weeds (Pub 505) is nearing the end of revision but no publication date has been set. Most of the information in this book is online at http://www.gov.on.ca/OMAFRA/english/crops/facts/ontweeds/weedgal1.htm
- New Factsheets were published on Wild Mustard, and Prickly Lettuce. These can be found on our website http://www.gov.on.ca/OMAFRA/english/crops/facts/03-041.htm http://www.gov.on.ca/OMAFRA/english/crops/facts/03-043.htm
- The Ontario Weeds page online at www.gov.on.ca/OMAFRA/english/crops/insects/weeds.html. (French version

http://www.gov.on.ca/OMAFRA/french/crops/insects/weeds.html) A free subscription service was added last year for notices of new content posted, and currently we have almost 1200 subscribers.

Service recommendations

The Ontario Weed Committee recognises that Leslie Huffman, Mike Cowbrough and Gilles Quesnel are doing a very good job at servicing the Ontario agricultural community on weed related issues. The development of a web based database that would contain weed control research results, as a means to enhance technology transfer from researchers to users, needs to be explored.

PULSE CROPS

STATE OF THE INDUSTRY

Manitoba white bean production after growing at a rapid rate the past 10 years, appears to be ready to shift a significant portion of these acres into soybeans. Although yields have been good, use of bin run seed, and lack of anthracnose resistant varieties has resulted in a significant problem with the disease. Manitoba had a price competitive advantage to many other growing areas in North America, attributed to lower land costs. Average yields in Manitoba were similar to Ontario, although white beans in Ontario had better quality in terms of larger size and higher seed moisture. Acreage of dry beans in other North American areas continues to decline, because of more favourable returns in other crops. At present corn, soybean prices show better returns, and producers may choose to grow these more 'price liquid' crops. Global consumption of WPB has been static near 7 million cwt. for the past 25 years. There have been no noticeable changes in consumption patterns, although dry beans are receiving increasing recognition for their health benefits. North American acreage has remained around 500,000 acres and N.A. production accounts for the majority of world production.

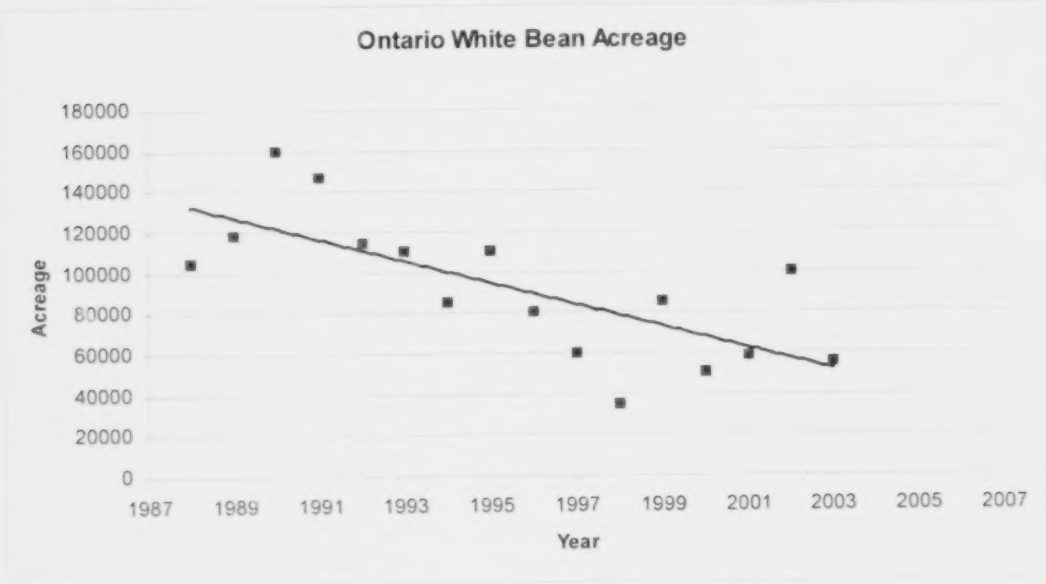
In 2003, Ontario farmers planted 55,000 acres of white beans in 2003. Dry bean yields were excellent with the overall average yield of white and coloured beans over 2000 lbs., well above the previous record in 1995 of 1700 lbs/ac. Quality and size were also excellent. The fact that growers often reported higher & yields returns than soybeans is a reminder of the importance of the diversity of field crops in Ontario.

One of the most serious diseases of dry beans, anthracnose was prevalent in white beans, but not in other bean types in 2003. The disease was evident in most varieties of white beans. OMAF collected and submitted samples for race typing, because of the appearance of a new strain of the disease in other growing regions(Manitoba, Min/Dak). It also appears that Minnesota/North Dakota (a major seed supplier) which were previously reported free of anthracnose, is also dealing with an outbreak.

Table 1. White Pea Bean Acreage Trends '000's Acres*

Year	Ont.	Mich.	Min/Dak.	Man.	Total
1988	105000	205000	206000	15500	531500
1990	160000	235000	257000	35000	687000
1992	114000	235000	160000	24000	533000
1994	85000	250000	160000	19000	514000
1996	80000	200000	190000	31000	501000
1998	35000	90000	180000	48000	353000
1999	80000	150000	235000	109000	574000
2000	50000	135000	225000	140000	550000
2001	58000	48000	125000	115000	346000
2002	100,000	85,000	240,000	140000	565,000
2003	55,000	40,000	111,000		

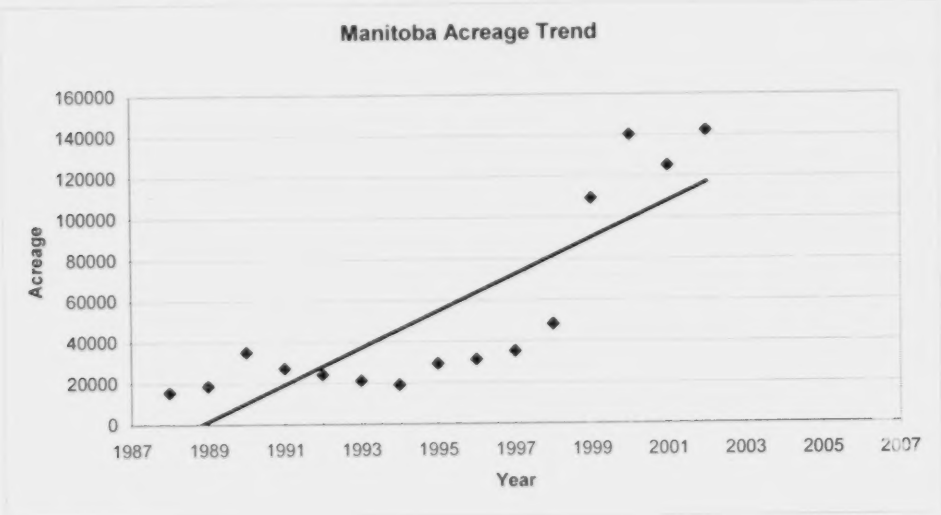
* Figures supplied by Ontario Bean Producers Marketing Board



(Table 2) Average White Pea Bean Yields*

	Manitoba	*Ontario*
1988	5.80	12.20
1989	5.81	13.15
1990	11.00	13.47
1991	11.57	16.73
1992	8.60	8.07
1993	4.61	14.14
1994	15.32	15.83
1995	14.04	17.38
1996	14.68	11.06
1997	14.00	14.77
1998	16.90	14.42
1999	16.57	16.41
2000	13	11.99
2001	14.7	10.27
2002	15.71	15.21

- Figures supplied by Ontario Bean Producers Marketing Board



Coloured Bean State of the industry

- Ontario coloured bean acres continues to expand (Table 2). Part of the expansion is due in part to the interest in production contracts. Production in other North American areas has declined somewhat. U.S. per capita consumption of Pinto, black beans and to a smaller extent cranberry has increased over the past 10 years, attributed in part to the growing Hispanic population. One significant trend is the average price for beans on the world market is dropping. This indicates greater economies of production are required as new production regions emerge. In Ontario, the 2003 yield, size and quality of the crop was excellent...

Table 2. Coloured Bean Acreage (Major classes)*

Year	Acres Insured	Average Yield
1991	15,182	18.4
1992	13,547	7.9
1993	19,108	15.9
1994	20,837	16.9
1995	25,781	17.1
1996	22,315	12.5
1997	23,527	17.1
1998	24,885	17.3
1999	43,666	16.2
2000	44,244	10.2
2001	53,377	-

* Figures supplied by Agricorp

Significant Research/Service Accomplishments

Evaluation of Seed Treatments for Control of Anthracnose

Accomplishments

- Initial trials to evaluate various seed treatments for control of anthracnose including Max – Apron(new) revealed DCT remains the product of choice for control.

Why was this work undertaken?

- Maxim – Apron seed treatment received registration on dry beans, and is expected to be the product of choice on dry bean seed imported from the USA. Most coloured bean seed is imported, while Ontario typically produces only 1 –2 generations of white bean seed.

Who did the work and how was it extended? Chris Gillard, RCAT- University of Guelph. Funding received from OMAF, Pesticide Co.

Number of Benefactors: Growers benefit from control of anthracnose. Harmonization of seed treatments with the U.S.A.

Dollar Impact: Outbreaks of Anthracnose in the past have caused serious yield and quality losses to the dry beans

Emerging Needs and Issues:

The 5 broad research priorities have not changed.

1. Genetic Improvement, and Cultivar Development of White and Coloured Beans
2. Edible Bean quality evaluation and utilization.
3. Integrated Pest Management for Insects and disease.
4. Integrated Weed Management
5. Development of alternative pulses, specialty market types and markets

Emerging Issues without specific research priorities:

6. Technology transfer
7. Performance testing
8. Biotechnology.
   Ownership of genes, transformation processes, and technology impedes the advancement of the industry through public/ private breeding efforts. Health concerns with PNT is interfering with the registration of varieties developed using traditional breeding techniques (E.g. OAC Rex). CFIA & Health Canada are concerned that OAC Rex is a novel type, and have requested that OAC not only prove that the variety is not different from other registered varieties, but also to pay for and produce the data for base line numbers for other registered varieties.
9. Flatulence. As the population ages, individuals develop more intolerance to high fibre diets. High fibre consisting of complex carbohydrates and partially hydrated starch contributes to flatulence.
10. Weed Control. Weed control herbicides available in edible beans relies on testing of herbicides registered for soybeans. The focus of herbicide research in soybeans has shifted from development of new active ingredients to introduction of novel trait herbicide resistance. In the next 5 years no new chemistry is expected to become available. This is of concern because of the reliance on group 2 chemistry, and the rapid increase of certain resistant weed biotypes. In addition limited chemistry exists for the control of certain problem weeds.
11. Internet auction of white beans.

TOBACCO

STATE OF THE INDUSTRY

The Ontario Flue-Cured Tobacco Growers' Marketing Board (OFCTGMB) is concerned about the declining crop production and its economic impact to the community in the southwestern Ontario. The production target for 2003 was 94 million pounds, 13% lower compared to last year. The target price is 2.2365/lb for 2003 compared to 2.2508/lb in 2002.

The tobacco industry lost about 100 producers from 2001 to 2002 because of the diminishing crop size and industry uncertainties for the long-term. This trend is continuing to occur this year, although no official numbers have been released.

The OFCRTGMB is proposing to both the federal and provincial governments a package that includes a buyout of quota and transitional assistance for growers.

Table 1: Area, yield, market production and total value of tobacco grown in Ontario

Year	Area (acres)	Quantity Sold		Total Value
		'000 lb	'000 kg	$ '000
2003*	35,498	-	-	-
2002	41,342	108,060	49,059	244,146
2001	52,977	117,094	53,161	267,683
2000	52,050	106,422	48,316	244,204
1999	56,425	142,379	64,640	308,929
1998	63,520	150,576	68,361	326,525
1997	64,005	154,913	70,330	341,928
1996	57,872	142,241	64,577	317,890
1995	62,181	152,196	69,097	316,814
1994	57,260	129,627	58,851	271,476

*Forecast

Significant Research/Service Accomplishments

1. The strobilurin fungicides and Actigard were found to give significant control of Target Spot (*Thanatephorus cucumeris* causal agent) disease in 2003. Also, the fungicides Quadris, Flint and Headline significantly suppressed the occurrence of Damping-off

(*Rhizoctonia solani* causal agent) in greenhouse seedling production but not to the same level as the benzimidazole fungicides, Benlate or Senator.

2. The severity of Target Spot disease was found to be significantly affected by tobacco cultivars and nitrogen rates. In general, disease was more severe with decreasing nitrogen rates except when the cultivar was exceptionally susceptible; in this instance increasing nitrogen rates did not lower disease severity.
3. Steam heat (>80 C for 30 min or longer) eliminated *Rhizoctonia solani* from Styrofoam seedling production cell trays. A variety of chemical treatments, however, were ineffective in disinfecting trays. .
4. The systemic acquired resistance activator, Actigard, was found to cause a significant decline in the yield and quality of flue-cured tobacco when used in the absence of Blue mold disease pressure.
5. The strobilurin fungicide Quadris caused a flecking injury to tobacco when applied as a foliar spray. Tobacco varieties varied significantly in the susceptibility to this Quadris-induced phytotoxicity. In general, older Canadian varieties were not susceptible to Quadris injury while American varieties and newer Canadian varieties tended to be more severely affected.
6. A leaf spotting disorder affecting the tobacco variety CT 572 was identified as weather fleck caused by ozone injury.
7. Haploid tobacco lines were produced after interspecific crossing with *Nicotiana africana*, and diploid lines were regenerated from them using tissue culture procedures. These lines have been screened for resistance to Black Root Rot disease.
8. Several hybrids (CTH1, CTH2 and CTH3) with superior yield and quality were advanced to regional registration trials. The results obtained from these trials are very encouraging.
9. The result from the small scale hybrid seed production trial conducted in collaboration with the tobacco seed growers in 2003 using male sterile lines was very encouraging. The three seed growers' involved in this exercise received the first hands-on experience in producing hybrid seeds. The tobacco seed growers have acquired the knowledge and experience to produce hybrid seeds in the event that a tobacco hybrid is recommended for registration.
10. Several breeding lines tolerant to blue mold diseases are identified in the breeding nursery in Mexico. Agronomic evaluation of these lines will be conducted in Delhi.
11. Grower information bulletin completed: Flue-cured tobacco best management practices-leaf chemistry.
12. Chemistry evaluation of grower leaf samples has resulted in significant improvement of the chemistry levels of most stalk positions.
13. The study on forage and grain millet in rotation with tobacco confirm that forage millet cultivar CFPM 101 and the grain millet hybrid CGPMH-1 can control nematode population as effectively as chemical fumigant.
14. Topping height study indicates that higher topping is associated with increase in yield, decrease in grade index value and decrease in total alkaloid concentration in the middle and upper stalk positions.

15. Nitrogen rate study indicates that increase nitrogen rate is associated with increase in yield and alkaloids, but decrease in reducing sugars particularly in the middle and upper stalk positions.

Emerging Needs and Issues

- CT157 registered in the year 2000 is the single flue-cured variety dominating the tobacco production in Ontario. In its first year of introduction (2000), 13% of the crop was grown to CT157. In 2001 the percent crop grown to CT157 jumped to 64%. In 2002 and 2003 the percent crop reached 68% and 73% respectively. The popularity of CT157 is mainly due to high quality traits and less off-grades associated with this variety. The tobacco industry raised some concern on a single variety dominating the market. For a high cash value crop such as tobacco, varietal diversification is highly recommended in the event of unexpected outbreak of new or mutated strains of diseases and insects.
- Rapid diagnosis of viral disease is considered crucial especially at a time when new crops are moving into the region to replace tobacco. Pest/pathogen identification issues are becoming increasingly important in the region.
- Tobacco Mosaic Virus (TMV) is still a concern. There were 2 new cases of TMV this year. TMV had not been a problem on these farms before and no equipment was borrowed. Infections occurred very early, before or at transplanting. NC 297 was grown on 2 farms this year. It is reported that this variety can self-destruct if TMV is allowed to enter through an injury site (i.e. at topping) and the temperature is above 30 C. However, none of this hypersensitive breakdown was observed. In North Carolina, there was a low incidence of this problem.
- Seedling establishment in trays-there is some concern with growers re-using Styrofoam trays. It is not cost-effective to use new trays each year, but diseases/pathogens can reside in the Styrofoam. Alternaria is typically not a problem, unless growing conditions are poor. This can setback seedlings. Other countries use copper treatments for control of certain pathogens, such as bacterial soft rot, which may be controlling potential problems with algae. CTRF is looking into the possibility of coating trays with a paint containing copper hydroxide for the control of algae. Copper can prevent root elongation.
- European chafer (white grubs) is becoming a more persistent problem. Research is needed to address this emerging problem. Insecticide "Poncho" may have potential as a transplant water treatment.
- Weather fleck caused by exposure to high levels of atmospheric pollutants is becoming a concern to tobacco growers. Compared to previous years, the damage due to weather fleck in 2003 was higher. The damage was more severe in heavy soils and low areas of the fields.
- Wireworm was a concern. The only chemicals available for wireworm are Orthene and Lindane. Other chemical options are needed.

STRATEGIC DIRECTIONS: RESEARCH

RECOMMENDATION 1

Agronomic Systems and Environmental Stewardship

Research leading to production systems and their components which enhance competitiveness, food quality and safety and environmental sustainability.

Successful field crop production requires the integration of many complex components. The target of high yields and high quality with low environmental impact while maintaining profitability is extremely difficult in biological – based systems, which operate in global markets subject to political influences. The ability to integrate decisions on cultivar/hybrid with those on planting date, tillage system, row width, seeding rate, weed management, pest management, heat unit area, soil type and a host of others plus all of the interactions between these components requires solid reliable research information. Research not only on individual components of production systems but research on the integration of those components (systems approach). Thrown into the equation are the inevitable shifts in pressures from new pests (aphids, European chafer, western corn rootworm variant), expansion of old pests (SCN, fusarium) new weed species (problem weeds, herbicide-tolerant weeds), soil management concerns and new issues of carbon sequestration and reduction of greenhouse gases. Imposed on this background is the fundamental requirement to maintain a competitive industry.

The research priorities described below attempt to address these issues through both strategic, integrated approaches and individual targeted goals.

SPECIFIC COMMODITY / DISCIPLINE BASED PRIORITIES

Ontario Cereal Crop Committee

1. Agronomic Technologies and Environmental Impact

Background: Research developing and evaluating new agronomic techniques is essential to determine strategies which will maximize returns for growers and processors, yet minimize or remove any environmental impact. These technologies are far ranging in nature, from fertilizer rates, placement, and timing to tillage techniques. This is a high priority for public funding as there is little impetus or benefit for private research in this area.

Where appropriate, environmental aspects of these technologies should be an integral part of the research undertaken. An excellent example of this type of research would be the investigation of nitrogen rates for higher protein wheat production. The research could determine appropriate nitrogen rates, predictive tools like the nitrogen soil test, use of combine protein monitors, value to the end user, and also investigate any environmental impacts on groundwater.

Economic importance: The cost of tillage and other inputs makes up a large part of the cost of production of cereal crops. Reduction of these costs, or increased efficiencies of inputs, would have a positive economic impact on all producers.

Competitiveness: Increased efficiencies or reduced costs will allow the industry to be more competitive.

Environmental: Targeted applications and increased efficiencies will reduce environmental impact of agronomic practices that are investigated.

2. Reducing Production Risks

Background: Control of risk factors is critical to ensure a stable supply of sufficient quantity and quality of cereal crops. Factors such as winterkill, fusarium, sprouting, rust and other problems can cause havoc with both quantity of product available, and quality to meet market requirements. Techniques and strategies to overcome or manage these risks would have a huge positive impact on the stability of the industry.

Examples of research which fits in this category is the development of the fusarium prediction model, the rust monitoring model, improved winter hardiness techniques, and others.

Economic impact: Risk factors are responsible for many of the critical situations that occur in cereals. If techniques can be developed to overcome these risk factors, the added stability of supply should have huge economic benefits, not only to producers but throughout the processing sector.

Competitiveness: Consistent supply of quality product will allow the sector to out compete other competing jurisdictions.

Social benefit: Consistent supply will allow stability for jobs involved with the sector.

ONTARIO CORN COMMITTEE

1. Greater Energy and Environmental Efficiencies – Ontario Corn Committee

Increasing energy use efficiency is critical to the health of the corn industry in Ontario. Specifically, research must continue to result in improved nitrogen use and grain drying efficiencies.

Nitrogen fertilizer represents a major input cost in corn production, is a significant component in many animal manures, and has the potential to adversely affect the quality of surface water and

groundwater. Cropping system research must take an integrated approach to combine tillage, crop rotations, and cover crops, manure management, soil testing, site specific technology, etc. to enhance productivity while protecting the environment.

Grain drying costs represent a competitive disadvantage to the corn industry in Ontario compared to many other jurisdictions. Research must continue to develop grain drying systems that represent reasonable capital investments while significantly improving energy use efficiencies.

ONTARIO OIL AND PROTEIN SEED CROP COMMITTEE

1) Control of Present and Potential Diseases and Pests.

Issue: Protecting soybean and canola production from disease, nematode, and insect losses is fundamental to high productivity and quality.

Background: The impact of soybean aphids in 2001 and 2003 is a prime example of how a single pest can significantly reduce yields and adversely affect quality across a wide geographic area. Effective control measures are necessary for both existing and emerging diseases and pests.

Major Diseases and Pests include:

Soybeans:

a. Soybean Aphids
b. Soybean Cyst Nematode (SCN)
c. Phytophthora/ Rhizoctonia/Fusarium root rots
d. Sclerotinia (White Mould)
e. Brown Stem Rot
f. Phomopsis

Canola:

a. White Mould
b. Cabbage Seed Pod Weevil

Potentially Significant Diseases and Pests:

Soybeans:

a. Soybean Rust
b. Sudden Death Syndrome
c. Soybean Mosaic Virus
d. Bean Pod Mottle Virus
e. Fusarium Wilt
f. Pod and Stem Blight

Canola:

a. Swede Midge
b. Diamond Back Moth
c. Black Leg

Background: The impact of a new soybean pest (soybean aphids) in 2001 and 2003 demonstrates how a single pest or disease can drastically affect the industry. Although the degree of yield loss sustained from soybean aphids varied greatly from region to region, yield decreases in excess of 15 Bu/ac were reported in 2003, with average losses of about 7-10 bu. High aphid populations under dry soil conditions also significantly reduced seed size, reducing yield and seed quality for the IP market. Soybean aphids decrease yield by sucking plant juices from the plant, stunting and weakening it. The honeydew excreted by the aphids causes a secondary fungal disease and the aphids are a primary vector for SMV and other viruses. More work is necessary to understand and develop tolerance and better management practices to control this devastating insect pest.

Although SCN has been present in the province for over 10 years, it remains a high priority. New resistance/tolerance traits and effective management practices are required. As SCN spreads to additional counties in Ontario and races change, a continuous effort in breeding for resistance will be required to ensure high productivity. Not enough SCN resistant varieties are present in the marketplace. There is also concern that present sources of resistant are beginning to be less effective than anticipated. An effort to incorporate multiple lines of resistance will become increasingly important.

Considerable success has been achieved in controlling phytophthora root rot by developing disease resistant cultivars. Resistance genes can be identified and incorporated into soybean varieties by relatively simple screening techniques. However, the development of new races necessitates the continuous development of new varieties with tolerance and monogenic resistance.

Sclerotinia stem rot is increasing in importance. The incidence and severity of the disease in 2003 was much higher than experienced in the last number of years in Ontario. Varieties differ in tolerance to the disease but monogenic resistance has never been identified.

2) Weed Management

Issue: The management/impact of herbicide tolerant crops in a sustainable cropping system and conventional herbicide research are still required.

Background: The increased use of herbicide tolerant soybean varieties has resulted in concerns of weed resistance and weed population shifts. With the use of a single chemistry to control weeds on so many acres, weed resistance to glyphosate in Ontario is almost inevitable. There are

also concerns over the possible environmental impacts of plants with novel traits. The control of herbicide tolerant volunteer plants in subsequent crops is also a concern.

Most food grade soybeans are conventional varieties that have not been genetically modified to tolerate specific herbicides. Weed escapes that adversely affect the quality of the harvested crop continue to be a problem, especially in years where poor weed control is widespread as it was in 2001. Nightshade staining in soybeans is a problem in some fields every year.

3) Cropping Systems Research

Issue: Developing sustainable production systems.

Background: During the last 15-20 years important changes have occurred in Ontario soybean production practices. Production systems must be investigated for sustainable production. Some of the major trends are as follows:

a) Increased acreage - A significant increase in soybean acres has occurred in the last 15 years from the expansion of soybean production into more northern and eastern regions. A reduction in rotation in the more traditional growing areas has also increased the yearly soybean acreage.
b) Reduced tillage - Soybeans are readily adapted to a variety of tillage practices. The introduction and widespread acceptance of RR soybean varieties as well as the development of the no-till seed drill has facilitated reduced tillage for soybeans, with its beneficial environmental impact. This is especially true in the shorter growing season areas of the province.
c) Narrow rows - Soybeans were traditionally grown in 30-inch rows in Ontario. The majority of soybeans are now grown in less than 22-inch rows with a large percentage grown at only 7 inches. Decreasing row widths has been shown to increase yields with no other significant increases in production costs. Narrow rows have an effect on the climate within the crop canopy and can directly affect weed populations, foliar, and root diseases. For example, white mould is more likely to thrive under narrow row conditions.
d) Reduced rotation - Although the importance of crop rotation has been shown time and time again, soybeans are still being grown too frequently in many parts of southwestern Ontario. The effect of this practice on soil structure, fertility, weeds and diseases requires additional research. The benefits of increased cereals in the rotation need to be further considered.

The following areas need further consideration:

Soybeans

a) Increasing no-till/minimum-till success - Production difficulties have occurred with reduced tillage on fine textured soils. The exact causes of these difficulties have not been well identified to date. Soil structure, soil moisture, and plant diseases may all play a role in these production problems.
b) Soil improvements and energy efficiency under different cropping systems.
c) Inoculation improvement for cool-season new production areas.
d) High slug populations have caused some long time no-till producers in the US northeast to revert to conventional tillage because no other effective slug control measures are available.

Canola

a) Agronomic studies on new winter canola types for nitrogen requirements, plant populations, planting date, etc.
b) Increasing no-till/minimum-till success

4) Soil Fertility/Soil Quality/Soil Management

Issue: Optimizing crop production while protecting soil and water quality.

Background: Water quality has become a major concern for many Ontario residents. The nutrient management act (NMA) will impact Ontario soybean growers. Residual fertilizer has become an increased concern for the farmers' return and the impact on water quality. Continuous fertilization with use efficiency as low as 15-20% during the year of application has resulted in large accumulation of phosphorus (P) levels in some soils. With the increased phosphorus level in soil, no-point source pollution from agricultural soils has been a concern on water quality. Knowledge gaps exist as to the effects of soil phosphorus management needs to be filled.

Canola is most often grown in livestock areas and viewed as an important crop for nutrient management. Further studies on nitrogen management are needed.

ONTARIO FORAGE CROPS COMMITTEE

1) Managing Climatic-related Risk in Perennial Forage Crops –

I) Genetic/Biotechnology Improvements with respect to winter survival

II) Develop management techniques for improved winter survival of conventional and genetically altered alfalfa, and develop management techniques to enhance production of grasses during drought conditions.

Background:
Perennial forages occupy more farmland than any other crop in Ontario. They provide the feed base for virtually all dairy, beef, sheep, goat and horses farms. Winterkill can range from no significance to severe losses in all areas of Ontario. Clearly variety selection and management have a resounding influence yet producers are still concerned and always fear another bad winter will result in a shortage of hay and higher prices. Since a secure supply of forage is critical to the operation of these industries, the OFCC feels that researchers have to concentrate more effort on methods to ensure that forage supply will be adequate.

Forage and livestock producers have stated quite clearly that climate related issues, especially winter kill of alfalfa are their number one concern. Genetic progress in alfalfa over the past 20 years has focussed on disease resistance, increased yields and improved quality. However, specific efforts are required by conventional or biotechnology means to improve winterhardiness of alfalfa without deterring from other traits, especially yield, that have been improved in the past. To complement this work, improvements in the winterhardiness of orchardgrass should be made, since this grass is increasing in use with alfalfa and is the key grass species used in sown pastures in much of the province.

In addition to genetic improvements, producers want management techniques that improve the continuity of forage supply over the growing season. This would include techniques in pasture management to even forage supply during spring and summer, cope with dry weather and extend the grazing season in the fall. Certain annual forage crops have potential to produce pasture or stored forage when the growth of perennial forages is reduced by drought or the onset of autumn. For stored forages, efforts should be concentrated on ensuring that management techniques are properly matched with the needs of new genetic material introduced into the marketplace. When new traits are introduced to alfalfa or other species, the management package may need to be re-evaluated. In other cases, what is considered normal management may need to change to better ensure winter survival of currently used varieties.

The OFCC recommends that research be directed at ensuring the security and continuity of forage supply with respect to climate related risk through improved genetics and management practices.

2, Forage Preservation and Storage

Forages in Ontario are either made into stored feed as dry hay, silage, or grazed. In stored feed systems, many losses occur from the standing crop to offering the stored feed to the animal. Attempts to minimise these losses have been the subject of previous research projects in Ontario and elsewhere. New efforts in equipment design may further reduce losses during forage preservation.

The goal of making "hay in a day" has been expressed by commercial hay producers. Such a system might incorporate hay maceration plus preservatives, or microwave hay drying. Hay

maceration is being studied in Quebec and in western Canada, while work on preservatives is widespread, although mostly in the private sector.

In the area of storage, much knowledge is available and extension is likely the key to progress in this area.

3) Forages and the Environment

Forages are generally quite beneficial to the environment. Studies in the past have shown improvements in soil structure, reduced soil erosion, and less runoff from fields with a perennial forage cover. New issues have arisen which need to be addressed. The use of forages as buffer strips along watercourses is common, but it is unclear what type of forage works the best or how large the buffer should be. The use of forages as a crop to store carbon in the soil is also an issue that seems likely to increase in prominence over the next few years. As the concept of full accounting gains prominence (including indirect costs of a practice or activity), the beneficial nature of forage crops on the soil, water and air could increase their value in modern crop production systems.

Another societal benefit associated with forages is the value of having livestock grazing pastures. In some parts of Europe, farmers are paid to maintain livestock on certain pastures because it increases the value of the area for tourism. While outside the scope of the OASCC system, it is reasonable that we should acknowledge the non-agricultural value of grazing livestock in the same way that we acknowledge the value of forages for soil quality and carbon sequestration.

A potential negative association between forages and the environment is the large volume of waste plastic that is generated each year from wrapped or bagged silage. It is imperative that more effort is put into recycling waste silage plastic or into creating biodegradable or photodegradable plastics that will not require land filling.

4) Corn Silage Issues

There has been a resurgence of interest in corn silage over the past number of years. This is especially true for the dairy industry. One of the key areas of interest has been corn silage varieties with modified quality traits (high digestibility or protein). However, no organized system for comparing silage hybrids exists and there has been considerable pressure to do so. Some have proposed that corn silage be recognized as a forage crop and thus responsibility for testing and extension be turned over to the OFCC. With regards to variety testing, the OFCC supported the concept that corn silage should be evaluated as a forage crop, but also acknowledged that the Ontario Corn Committee (OCC) had the geographic locations, experienced personnel, and equipment to carry out corn silage variety testing. This was expressed by the OFCC to the chair of the OCC in writing. In the area of production and management, the OFCC production sub-committee was quite strong in stating that corn silage is a forage and that research and extension

efforts are needed on this aspect of the corn crop. It was felt that the OFCC could take on this role if necessary (non-variety testing issues).

5) Weed Management in Forage Crops

Background:
As in any crop, weeds are ubiquitous in forages. During the life of a forage stand, weeds can reduce yields, affect hay drying and reduce palatability. Weeds such as witchgrass in timothy or black medick in birdsfoot trefoil and red clover fields grown for seed can make seed cleaning difficult which affects the acceptability and quality of the seed. In pastures, weeds that invade the desired forages limit productivity and carrying capacity. As well, some weeds in pastures may lower animal productivity due to toxic compounds, prickles that scratch the throats of grazing animals, weeds that impart foul odour or taste to milk and structures like burrs that cling to wool. Weed management is an integral part of overall crop management because weeds have a profound effect on productivity and feeding value. The importance of weeds in forage management is such that it needs to be specifically addressed. Forage producers are concerned with controlling the annual broadleaf and grass weeds at establishment that can impede successful implantation of the stand. Another issue of major importance is control of perennial weeds such as dandelion, quackgrass, smooth bedstraw and Canada thistle. Weed management has an impact on several other areas deemed as priorities such as yield, environmental benefits, forage crop longevity, feeding value and grading system.

Research needs: Research efforts must continue to address the effects of weeds on yield, stand longevity and forage feeding value. The environmental impact of various weed management methods for forage crops should be assessed. In addition to investigating weed management in forages, work should also be conducted on using forages as a weed management option.

- The problem of weeds at stand emergence still needs to be addressed. Some of the commonly used broadleaf herbicide products restrict grazing or feeding of the forage in the year of treatment. The manufacturers are working toward removing that restriction. New formulations of products are currently under test and should continue to be monitored.
- New products, tank mixes, adjuvants, rates and application methods must continue to be evaluated to provide forage producers with as many options as possible to control weeds at all stages in the life of a stand.
- Continued investigation is needed into integrated approaches to weed control in hay, pasture and seed crops focussing on cultural, mechanical and chemical methods. Additionally, the role of forage species, mixtures, varieties, seeding rates and dates as means of cultural control is necessary given the expanding uses for forage crops and the introduction of new forage species.
- Using forages as cover crops, inter-crops and living mulches in other crop and non-crop situations is another aspect of weed management that would promote work on forage varieties and environmental benefits.
- The effects of weeds on forage feeding value in terms of nutrients and palatability should be assessed.

- Identification of new emerging weed problems in forages, their impact on productivity and options for their management is important.

1. Strategic Approach to Controlling Field Crop Pests – Field Crop Pest Management Committee:

The following list of field crop pests are placed in order of priority in terms of research needs. Strategies differ for each pest and include management, chemical controls, breeding, economic thresholds and pest biology. In most cases no single approach is warranted, but rather an integrated long-term strategy involving several approaches is advised. This should involve collaborative work with pathologists, entomologists, breeders and agronomists.

Soybean Aphid: Economic impact (thresholds), Management, Chemical controls, efficacy and non-targets, Plant breeding, Biology, life cycle, overwintering, sooty mould relationship, Relationship with other insects, Vectoring viruses

European Chafer: Decision Thresholds, Scouting monitoring predicting, Biology, Control measures, Chemical, Cultural, Biological

Fusarium: include economic impact statement when sending this to FCRSC and OPMRSC. Resistance breeding, New chemistry, Grading system wheat- inconsistent

Soybean Cyst Nematode: Population dynamics -Race shifts, Spread of SCN, Management

Corn Rootworm: Risk assessment for soybean variant in Ontario

White Mould: Resistance, Management - New products to replace lost Chemicals

Root Rots (Pythium, Phytophthora, Rhizoctonia, Fusarium), Thresholds, Better management tools Biology

Corn Stalk Rots (Anthracnose, Fusarium, Gibberella) Implications of cropping systems to disease, Management

ONTARIO WEED COMMITTEE

1) Evaluate weed control effectiveness and crop safety of herbicides to assist registration of new products, allow minor use registration in field crops and provide information on environmental impact.

2) Develop methods to improve weed control efficiency and reduce weed control costs by determining weed specific post-emergence herbicide rates and critical factors affecting their performance, and evaluating site-specific methods of application.

3) Optimization of Integrated Weed Management (IWM) systems that incorporate alternative management methods, such as cultural or mechanical, in order to reduce the negative impacts (e.g. weed shifts and resistance) that result from dependence on single weed control strategies.

4) Develop management strategies that will be sustainable in the long term for emerging problem weeds.

5) Document occurrences of herbicide resistance in Ontario and characterize their resistance spectrum and biology so as to develop effective management guidelines and strategies.

5) Determine the impact of nutrient management programs and of soil nutrient levels on weed thresholds, weed germination patterns weed population dynamics and the effectiveness of control measures on annual weed species.

The issues and priorities encompassing multiple commodities have been grouped in the Pest Management category:

1) To continue herbicide efficacy and residue work leading to registration of minor use herbicides under the URMULE program in horticultural crops, specialty field crops and for problem weeds not currently on product labels in field crops.

2) Evaluate and monitor the ecological and environmental impact of herbicide tolerant crops, including (i) shifts in weed populations, (ii) development of herbicide resistant weed biotypes, (iii) transfer of recombinant genetic material to other plant or microbial species, and (iv) changes in the composition of soil microbes.

3) Develop improved methods for the rapid and efficient detection of herbicide residues in relation to: (i) off-site contamination (drift, run-off, leaching) (ii) herbicide carry-over and crop rotation, and (iii) applicator, grower, bystander exposure to dislodgeable foliar residues on plants.

4) Study the biology of herbicide resistant weed biotypes so as to optimize prevention and management strategies in order to prevent the development of multiple-resistance.

5) Evaluate the effectiveness of cultural (e.g. crop rotation) and mechanical methods of weed control in combination with weed specific herbicide rates (minimum lethal dose) to minimize herbicide use within integrated weed management (IWM) systems.

6) Establish economic thresholds for problem annual and perennial weeds, with consideration for crop quality, dockage, harvest moisture, and weed seedbank issues.

7) Investigate weed biology and ecology including basic research on seed biology, population dynamics, physiology, weed-crop interactions and impact of composting on seed viability.

8) Evaluate advanced sprayer technologies, including site-specific applications, which have the potential to reduce herbicide rates, spray drift, spray volume, sprayed area and effects on non-target organisms, to meet the needs of custom applicators and growers.

9) Evaluate and monitor the impact of unsprayed buffer zones along field margins on weed population dynamics and crop yields, and develop vegetation management systems for field margins, roadsides and rights of way

10) Identify new invasive weed species that displace native vegetation in non-crop habitats and are difficult to control in field and horticultural crops and, and develop management strategies.

11) Determine the environmental variables affecting the production, release and dispersal of pollen from allergenic weed species such as ragweed and develop a model predicting the timing and severity of pollen load near major metropolitan areas. This will permit the development of an accurate Pollen Load Index ensuring medication is taken at the optimum timing so it retains its effectiveness.

ONTARIO PULSE COMMITTEE

Issue: Integrated Pest Management for Insects & Disease
Target Agency: University of Guelph, OMAF, AAFC, and OCPC
Title: Continue funding development of IPM strategies for Pest Management for Edible Beans
Details:

- Review of IPM for leafhoppers. Review threshold levels, Trap crop strategies, management strategies that integrate experimental seed treatments for control
- ***NEW*** - Evaluation of seed treatments for control of Anthracnose.
- ***NEW*** - Evaluation of impact of soybean cyst nematode on various bean types.
- Evaluation of seed treatments to replace lindane.

Background

- **Leafhoppers** are important insect in edible beans for which up to 3 applications are required for control in a season. Research work conducted by RCAT with seed treatments indicate excellent early season control that may replace/reduce the need for sprays. Differences in tolerance/resistance factors of various bean types need to be investigated. Research/extension efforts are required to develop IPM program. Preliminary trap crop strategies using a susceptible cultivar (burna) have been unsuccessful. Current threshold for spray recommendations are based on a limited number of field trials
- **Anthracnose :** A new seed treatment Apron – Maxim has received registration on edible beans. On imported seed, this product is expected to be the product of choice in the future. Most dry bean seed is imported from the U.S. Limited research elsewhere has shown some control of anthracnose.
- A replacement to lindane insecticide is required for control of two important seed/seedling pests of edible beans; wireworm, seedcorn maggot and occasionally white grub and others.

- **Soybean Cyst Nematode** continues to expand across soybean growing areas, including major dry bean areas of the province. Dry beans are a known host of SCN, but little research has been conducted of their impact on various dry bean classes, and to IPM strategies.

Issue: Weed management in edible beans
Target Agency: AAFC, U of Guelph, OMAF, and OCPC
Title: Expand research funding to include emerging niche edible bean types
Details:

- Evaluation of new chemistry for control of weeds in edible beans
- Evaluation of safe rates of new/existing products on various edible bean classes. Expand research to include other niche classes including Otebo, kintoki, adzuki.
- Control of problem weeds including strategies to manage resistant biotypes.
-

Background:
A limited number of herbicides are presently available and little new chemistry is expected to become available in the foreseeable future. Large differences in bean type tolerance to available chemistry needs further work. Research into control of problem weeds also requires additional research. Edible beans are not as competitive a crop against weeds as soybeans; thus weed control is often more difficult. Further, weeds present at harvest will cause severe staining of beans if a pre-harvest desiccant is not used. Effective weed control during early growth stages may reduce/eliminate the need for a pre-harvest spray. Having a strong IPM program for weeds increases the appeal of edible beans with end market users.
Knowing the biologically effective herbicide rate for control of problem weeds will help growers minimize herbicide use by adjusting the dose to the particular weed problem. Research trials conducted by RCAT have documented significant differences in tolerance to herbicides amongst various bean types.

ONTARIO TOBACCO COMMITTEE

Pest management

1) Fungicide screening for damping-off of tobacco caused by *Rhizoctonia solani* (CTRF) (Short term research priority, ongoing project)

2) Investigate insecticides with different chemistries for the control of aphids, wireworms, white grubs, seed maggots and cutworms for the purpose of resistance management (CTRF) (short term research priority, aphids – ongoing project)

3) Investigate compounds that inhibit the growth of algae in used trays (i.e. copper products) (CTRF) (short term research priority)

4) Fungicide screening for control of metalaxyl-insensitive blue mold (CTRF) (short term research priority, ongoing project)

5) Evaluation of control measures for control of bacterial soft rot, *Aspergillus* and moldy tobacco which would include the evaluation of sucker control products with improved efficacy and lower usage rates than those used currently (CTRF) (short term research priority, ongoing project)

6) Development of fumigant replacements, millet or other nematode suppressing crops to control nematodes (CTRF) (short term research priority, ongoing project)

7) Fungicide screening for greenhouse and field control of target spot and *Alternaria* (CTRF) (short term research priority, ongoing project)

8) Herbicide screening in tobacco and rye crops. (CTRF) (short term research priority)

9) Evaluate different irrigation practices that use water more efficiently (i.e. trickle irrigation, fertigation) (CTRF) (short term research priority)

10) Insecticide screening for the control of harvester ants with the focus on resistance management (CTRF) (short term research priority)

Recommendation 2

Innovative and Enhanced Germplasm Development and Utilization.

This section will include crop breeding, performance evaluation, physiology and the development of new molecules, gene discovery, genomics, and bioinformatics to produce knowledge and materials to advance the industry.

The research described within this recommendation strives to develop the raw materials and the knowledge base leading to a vibrant and diverse field crop sector. It includes breeding for increased competitiveness, new markets, life-science based products and processes and improved quality. It includes basic research in the areas of genomics and bioinformatics to discover new applications and uses, to increase efficiencies of breeding systems and to dramatically broaden the utility of basic commodities. The overall goal is to produce new, higher value products for the industry and to do it quickly and more efficiently. The priorities listed also include research programs in the area of crop and plant physiology and document strong support for enhanced performance testing systems.

ONTARIO CEREAL CROP COMMITTEE

1. Performance Testing – Ontario Cereal Crop Committee

Background: Development of new varieties for Ontario conditions is paramount to a strong agricultural sector. Registration requirements have been reduced, in order to allow for a more rapid entry into the marketplace for varieties with special traits and/or higher yield potential. While entry of these new genetics is positive, evaluation of area of adaptability and other agronomic traits is essential to allow the industry to prosper. A strong performance testing system is the most efficient method of determining the best way to use new genetic developments. Without performance testing, it will be very difficult for the industry to move forward to the benefit of all.

Economic importance: The value of this system is difficult to determine. Conservative estimates place the increased production and quality potential at $20 million dollars annually.

Competitiveness: The identification of better yielding and area specific cereal varieties gives Ontario growers a competitive advantage to areas that do not have broad based, well designed performance testing systems. This leads to a more competitive milling and baking industry, as quantity and quality of needed products can be produced close to home, reducing transportation and storage costs.

Social benefits: Growers are less dependent on support programs with high yielding, premium quality crops. Further development of the handling and processing industry will be encouraged, leading to increased employment and prosperity.

Environmental benefits: Higher yielding crops sequester more carbon, add organic matter back to the soil, and help reduce potential erosion through improved soil structure and canopy effects.

ONTARIO CORN COMMITTEE

1. Genetic Improvement of Corn for Ontario

The existence of an efficient continuum from inbred development through to commercial hybrid evaluation is critical to the Ontario corn industry. Elite germplasm may be developed to increase productivity, meet specific needs of a bio-based industry, or to confer nutritional improvements. However, these advances will have little impact on the provincial economy unless a system exists for ensuring that these advances can be integrated, refined and tested across Ontario.

Many of the priorities for the corn industry depend upon the successful incorporation of genetic traits, natural or modified, into superior breeding lines (e.g. cold tolerance, pest resistance, premium market traits, etc.) Although there are large hybrid development programs in the

private sector, inbred/hybrid development must also continue to be part of the public breeding programs, since it is only through locally adapted germplasm that the true value of genetic enhancements to corn growers can be properly evaluated.

Within Ontario these public programs are important sources of "early" germplasm to be fed into the private sector breeding programs and they serve as the backbone for identifying the most efficient commercial hybrids.

2. Enhanced Pest Resistance in Corn

Fusarium
Corn grown in Ontario continues to be prone, periodically, to severe infection by Fusarium ear rots. The toxins produced by these moulds seriously affect the performance and health of hogs, in particular, and may also affect the performance and/or health of other livestock, and humans. Livestock feeds still represent the greatest usage of corn in Ontario and the usage of corn for human consumption is increasing. Thus, high priority must continue to be given to the development of corn lines with resistance to Fusarium ear rots.

Work at ECORC and University of Guelph have investigated the mechanisms of ear rot infection and identified sources of resistance. Continuing funding is needed, however, to assist with the incorporation of genes for resistance into breeding lines and then into commercial breeding material, using both conventional breeding methods and biotechnology.

Leaf Diseases
In recent years there has been a substantial increase in the use of cultural practices that leave higher levels of crop residues on the soil surface throughout the winter and subsequent growing season. The presence of corn residues on or near the soil surface increase the risk and/or severity of infection from various fungal leaf diseases, such as eyespot, leaf blights and rust. In addition, leaf diseases not currently present in Ontario are threatening to move into this province from adjacent States in the USA. Hybrids currently grown in Ontario may have little resistance to these diseases.

Sources of genetic resistance to leaf diseases need to be identified and rapidly incorporated into superior inbred lines, using both traditional breeding methods and biotechnology. Success of this breeding effort and the prevention of devastating disease infestations will require the support of a plant pathologist with expertise in corn diseases.

3. Improved Cold Tolerance in Corn

This research area is key to enhancing competitive advantages for Ontario corn production as US based breeding programs have less interest in the genetics or physiology of cold tolerance.

There is a distinct need to develop reliable techniques to assess tolerance of corn hybrids/inbreds to chilling during grain filling, and determine if chilling tolerance during grain filling is correlated to early season cold tolerance.

More information is required regarding the conditions that limit corn growth, germplasm that will prosper in cool conditions, and the relationships that exist between traits that provide superior performance under both warm and cool conditions.

Ultimately, the goal is to incorporate superior cold tolerance into superior lines in corn breeding programs.

ONTARIO OIL AND PROTEIN SEED CROP COMMITTEE

1. Genetic Enhancement for Production Stability and Risk Management.

Issue: Continued genetic enhancements are required to maintain competitiveness in international and domestic markets.

Background: Genetic enhancements lead to significant increases in productivity and economic gain without large increases in production inputs. Lower provincial soybean yield averages in 2001, 2002, and 2003 have emphasized the need for the continued improvement in plant genetics.
Biotechnology and genomics research offers new opportunities for soybean and canola improvements. The continued development of biotechnology tools is necessary for use in breeding and to provide understanding of the genetic control of traits, especially complex traits. Conventional breeding programs and the processing/distribution chain will increasingly rely on molecular markers for selection of complex traits, for stacking multiple traits (especially disease resistance genes), and for cultivar identification.
There has been renewed interest in winter canola in the last two years due largely to the registration of improved cultivars from Europe. Further winter canola variety development is required to improve yield, winter hardiness, and disease tolerance.

2. Performance Testing of Varieties

Issue: Information for variety selection decisions must be available to maximize production.

Background: The variety registration process continues to be under review. With the imminent loss of both merit and performance data requirements for soybean variety registration, even more emphasis will need to be placed on generating data which allows producers to make profitable variety decisions. Benefits to a strong variety testing system include:

a) Ontario soybean producers can grow new varieties with confidence.

b) Performance data for the shorter season areas of Ontario is especially important, as little or no other data may be available.
c) All new varieties, whether they are derived from conventional breeding programs or from biotechnology, need performance data to succeed in the industry.
d) Growers need unbiased performance data to explore the potential benefits or drawbacks to new market classes.

ONTARIO FORAGE CROPS COMMITTEE

Improving Feeding Value of Forages for Stored Feed and Pasture

1. Continue and improve the public system of forage variety testing in cooperation with industry stakeholders.

Background:
The OFCC has been conducting unbiased evaluation of varieties for yield and persistence since the committee was established in 1956. The work was undertaken to: i) Identify the varieties which merit use by forage producers in Ontario ii) Provide relative performance information among forage varieties available in the marketplace, and iii) Provide data to Canadian Food Inspection Agency to allow the legal sale of these varieties. In 1991, the OFCC was the first provincial recommending committee to undertake quality evaluation of forage varieties in addition to yield performance.

Forage yields and quality samples are collected from OFCC registration trials at public testing centres. The OFCC worked with the Seed Trade and the Canadian Food Inspection Agency during 1997 to improve the system of support for variety registration. This allowed varieties that meet OFCC performance criteria to be supported for registration using some or all data from outside Ontario. This allowed producers to have access to these varieties 2 years earlier than under the previous system. The OFCC still conducts performance testing and still provides performance data from public trials in Ontario to producers as in the past.

A significant change could occur over the next year as the CFIA has proposed that merit-based registration be eliminated for all forage crop species. Whether a requirement for some data on agronomic performance will be required is not clear at the time of writing. This could significantly affect the performance testing system since new varieties may no longer have a legal requirement to be tested in public Ontario tests. The OFCC has prepared a position paper to present to CFIA which recommends that some agronomic data be available to producers at the time of registration. (Appendix I) The OFCC has essentially accepted that quality testing cannot be made financially viable through the committee structure and has decided to eliminate that option for the near term. At the same time, the OFCC has redesigned its fee structure in an attempt to secure enough funds to continue public testing while still extending the results of the testing to the end user. (Appendix II) The new fee system should eventually incorporate not only

the seed trade, but also commodity groups and other interested parties.The OFCC recommends that variety testing for yield and persistence be continued.

2. Improving feeding values of forages for stored feed and pasture.

I) Genetic/biotechnology improvements to energy content and/or other desirable quality traits.

II) Management of forage crops to optimize feeding potential

Background:
High quality forage is the engine that drives the dairy industry in Ontario. Similarly, the beef and sheep industries rely to a great extent on high quality pasture and hay to ensure both milk production and proper rebreeding. Efforts to increase quality in both stored feed and pasture must be made to ensure that increased animal performance can be achieved from forages.

Alfalfa is the main stored forage used in Ontario. It supplies adequate amounts of crude protein when harvested at the correct stage of maturity, but it is significantly lower in energy than grains such as corn or barley. Alfalfa that has been selected or genetically modified to have higher digestible energy content would allow it to fill a higher proportion of the ration for milking cows and thus reduce feed costs. Progress has been made in the production and assessment of alfalfa varieties with reduced NDF levels and increase cell wall digestibility. Another area of interest would be to modify the types of protein found in common forage plants.

High quality forage harvested as pasture can be a very economical method to feed beef cattle, develop beef and dairy breeding heifers, and grow market lambs. If these enterprises are to grow and prosper, more emphasis needs to be placed on managing the pasture resource to produce higher quality forage. Researchers need to focus on the forage quality requirements of the whole farm to integrate various methods and times of forage harvest into one complete system. Annual forage crops for stored feed or grazing should be considered here as well. The goal of the complete forage system should be to provide the maximum amount of nutrition from forages on a year round basis, supplementing with other feed sources only when the forage resource cannot provide those nutrients.

New species of forages need to be investigated for their ability to provide high quality forage in either pasture or stored feed systems. Before new types of alfalfa or other species are introduced to the marketplace, work should be done to ensure they can provide similar quality to existing material or else determine what management regime is needed to achieve the desired quality.

The OFCC recommends that research be directed at improving forage quality through genetic improvements, changes in management practices or evaluation of new species.

3. Forage yield

In the current situation, very little plant breeding work is being done on alfalfa or trefoil in the province. In other legume species and in the grasses there is no varietal breeding effort at the present time. Most alfalfa varieties on the recommended list are now coming from one of five breeding programs in the United States. In all other species new varieties are random arrivals from any other temperate agricultural part of the world. In other words the competitive advantage of Ontario's forage industry in terms of superior varieties is largely a lottery of arrivals.

It is a concern of the OFCC that so little effort is directed at improvements in the yield of forages being grown in the province. Clearly advances have been made from multiple pest resistance in alfalfa to improvements in winter hardiness of red clover. Some varieties have been truly outstanding, such as Climax timothy released in 1947 and still on the list....but is it time to reemphasize the importance of remaining competitive in all of the forage species? The grass breeding program at the Ottawa station has been terminated. None other exists in eastern Canada.

4. OFCC Forage Cereal Test

In 1993, the OFCC was approached by a seed company interested in testing cereals and cereal-pea mixtures that were developed for forage use. This occurred at a time of increased interest in harvesting cereal companion crops as silage instead of grain. The OFCC initiated a test in 1994 to assess the yield of these entries under standard conditions. Since then, over 25 entries have been tested. Current testing locations include Kemptville, Elora, Huron Park, New Liskeard and Thunder Bay. Interestingly, performance of special purpose cereals (ie: forage oats) was only marginally better than the check variety (Rigodon oats). Thus many entries now being tested are grain type cereals that have been mixed with a field or forage-type pea. On-farm, there is more interest and greater use of cereals as forage over the past five years, in part due to the awareness raised by the OFCC testing program. The currently recommended entries appear in the OFCC's Forage Crop Variety Performance brochure.

ONTARIO PULSE COMMITTEE

1. Cultivar Development and Genetic Improvement of White and Coloured Beans

Source: Variety Subcommittee, Ont. White Bean Producers, Ontario Coloured Bean Growers, Ontario Bean Dealers, Pulse Canada.
Target Agency: AAFC, OASCC, U of G, OMAF
Title: Funding support for bean-breeding position located at the University of Guelph. Continue to fund bean breeding and food quality evaluation of edible beans at AAFC, Harrow.
Details: Full funding for a bean breeding position located at the University of Guelph.

The detailed objectives are listed in order of priority; cultivar release and germplasm improvement through intra- and inter-specific hybridization followed by conventional and biotechnology-aided selection methods.

New for 2003: The registration of the first bacterial blight resistant variety of white beans OAC Rex is a significant step forward for the dry bean industry. A new joint project with Manitoba to field test OAC Rex with other susceptible varieties will be carried out. In addition breeding programs to introduce resistance into other varieties and bean types will be undertaken

1) Conventional breeding of cultivars for:
- Yield and yield stability
- Quality traits includes cooking and canning quality, seed colour and size, mechanical damage etc.
- Agronomic traits including upright plant architecture, harvestability, row spacing, disease resistance, environmentally friendly production
- Improved yield potential with early to full season maturity and upright plant archetype,

-Cooking and canning quality acceptable for domestic and international trade,
-Increased resistance to common and halo bacterial blight, white mold and root rot diseases,
-Pyramiding resistance to anthracnose and bean common mosaic virus races prevalent in Ontario and other major genes controlling resistance to pests,
-Transfer of resistance to potato leafhopper to dry beans adapted to Ontario.
-Testing lines/cultivars in coop. trials to identify superior lines for registration and to generate performance data.

2) Application of biotechnology to improve efficiency in cultivar development through:
-Identification of RAPD markers linked to common bacterial blight resistance genes aiding molecular marker assisted selection
-Integrating selection methods based on molecular estimates of genetic distance with conventional selection techniques to accelerate simultaneous improvement of yield, adaptation, quality and pest resistance,
-

3) Germplasm improvement and utilization through:
-Multi-cycle intermatings of adapted and donor germplasm sources (within and between Meso-American and Andean races, and utilization of tepary bean and scarlet runner beans) to widen the germplasm base,
-Release of improved germplasm to breeders of private and public institutions.

Background: University of Guelph removed funding support for bean breeding position and pathology work. Cultivar development of varieties best suited to Ontario growing conditions is critical for Ontario to retain its competitive advantage and international reputation for dry edible beans. Although white bean acreage has been shrinking over the past 10 years, coloured bean acreage is expanding. Bean breeding programs in Ontario has been highly successful in producing high yielding, high quality cultivars, with improved disease tolerance/resistance. Dry edible beans have a value of $40 M to Ontario producers. Over 85% of the dry bean crop

produced is exported. Buyers are moving toward ISO9000 trade specifications that demand accountability for high bean quality. It order for Ontario to remain competitive, identification of superior varieties is paramount. Some markers have been found in recent years and are now being used in breeding programs. There is currently no di-hploidy development or transformation research occurring. Pulse Canada in its research strategy proposal is proposing that edible bean breeding focus in Ontario be on white beans, kidney, cranberry, and black beans, and alternative types. Gene mapping and marker assisted selection was identified as a high priority under biotechnology section of the Pulse Canada strategy. Edible beans add to the diversity of crops, which supports good crop rotations, agricultural diversity and risk management principals.

Recommendation 3

Market Responsiveness
Research strategies to address market development, new product development, food safety and enhancement.

Competing in traditional commodity markets will become more difficult for Ontario producers in the next several years. This will require increasing emphasis on the development of new higher-value markets for Ontario field crops with the integration of the producer up the value-chain. Research in these areas has been ongoing for several years, however, with the increasing emphasis on life-sciences and food quality and safety, further targeted efforts are required. Most of this work will strive to take advantage of the history of I.P. crop production in Ontario and the existing and developing infrastructure to support these markets.

ONTARIO CEREAL CROP COMMITTEE

1. New Markets

Background: Development of new markets is a way to expand acreage and value of the crops grown. When successful, efforts of this nature often have great benefit. Milling oat and malting barley are two areas that are currently underway within the sector. This has the potential to expand production by up to 100,000 acres, into a premium market. Other opportunities exist that should be investigated.

Economic importance: Premiums for this type of market often run from $10 to $40 per tonne to the producer, and can develop whole new processing opportunities. Care must be taken, however, to discern actual acreage that could be affected by these developments. Development of high value biotech components that require very small acreage, while beneficial, have far less overall economic impact to the sector.

2. Improvement to Grading System

Background: Grain grading has tremendous impact through the industry. Grain downgraded reduces the price paid to the producer, may restrict export options, and grain that is not graded properly due to factors like fusarium can become unusable by millers once actual vomitoxin levels are known.

Despite the importance of grain grading to the industry, it has remained a subjective test, relying on visual inspection for colour and other parameters. With the vagaries of human eyesight, this has led to many inconsistencies within the grading system. This was proven by a study undertaken in 2000 by Dr. Art Schaafsma.

Development of an objective grain grading system is essential to ensure proper streaming and returns of grain produced and processed across the industry.

Economic importance: Grain graded as feed that is actually of milling quality reduces the price paid to the producer by $15/tonne. Grain that is accepted as milling quality, which is subsequently found to be above acceptable limits for vomitoxin, is of no value to the miller and must be removed from the system at significant cost.

Competitiveness: A consistent and accurate grain grading system would ensure that buyers of Canadian grain abroad would receive the quality of product that they expected. This would further enhance the Canadian reputation for quality, and premiums attached. This grading system would also ensure that both producers and end users in the province are treated fairly.

ONTARIO CORN COMMITTEE

1. Develop Value Added Markets for Corn

Food grade quality corn represents a major value-added market for Ontario corn that has the potential to expand significantly. Currently, much of the market is being filled with corn or corn products from the U.S.A. Development of food grade quality corn suitable for production in Ontario represents a significant import-replacement opportunity, as well as an important export market.

Research has begun within the University of Guelph, primarily at Ridgetown College, directed toward breeding early white, food grade corn inbreds and hybrids, suitable for production in Ontario and toward identifying yellow corn hybrids of food grade quality, in co-operation with the private sector.

Long-term funding is required to enhance the technical support for these programs and to ensure the continuation of this work.

ONTARIO OIL AND PROTEIN SEED CROP COMMITTEE

1. Development of Speciality Soybeans and Alternative Uses

Issue: Research is required to develop areas that will increase the utilization and value of Ontario soybeans.

Some of the main areas of interest include:

a) Industrial Utilization
   I) Biodiesel
   II) Enzymes
   III) Solvents
   IV) Waxes
   V) Plastics
b) Health Benefits
c) Food Use
   I) Food grade soybeans
   II) Food Ingredients
   III) Organic production
d) Functionality
e) Nutraceuticals and Pharmaceuticals
f) Increasing crush value

Background: Soybean oil and protein are used in the manufacture of human food, animal feed, and various industrial products. New and existing areas must be explored to increase the utilization and value of Ontario soybeans.

ONTARIO FORAGE CROPS COMMITTEE

1. Forage Grading System

The importance of a well defined grading system in the buying and selling of agricultural commodities is undisputed. In contrast, no uniform grading system for legume, grass or mixed hays exists in Canada nor in the U.S. Hay purchasers located in areas with no consistent hay grading system must evaluate each hay lot purchased. They can apply the hay grading system of their choice, sample hay and run chemical analyses to evaluate hay quality, or visually inspect hay and make an informed opinion of the hay. The best method involves combining visual judging with chemical analyses. With many components to evaluate the problem becomes one of simplifying the values to establish a grade that satisfies both seller and buyer.

The problem is particularly acute in Ontario where hay may be shipped long distances. Markets exist not only in the southern U.S., but also overseas. The OFCC regards this issue as an important one that requires a system parallelling the benefits of other commodity grading systems

such as corn or wheat. The OFCC defines this issue as one of pulling existing information together and arriving at a consensus rather than one that requires an expansion of research efforts.

ONTARIO PULSE COMMITTEE

1. Edible Bean quality evaluation and utilization

Source: Variety Sub-committee
Target Agency: AAFC, U of Guelph, CARC, Pulse Canada, ARIO, and OASCC
Title: New funding is required to conduct literature review, and compositional analysis of dry beans.
Details:

- Funding is required to conduct a literature review of research on quality components, compositional analysis, traits that may have special value.
- Research to address standard methodologies in conducting analysis.
- Compositional analysis to identify unique inherent traits that may have health benefits, neutraceutical, or industrial uses.

Background:
Customers of edible beans are placing more value on quality traits. The industry needs to examine the composition of edible beans for traits of special value for food, neutraceuticals, or industrial uses. Examples would include screening for components such as Biofavonoids, Saponins, oliosaccharides. Ontario is well positioned to grow premium priced speciality bean types and have the identity preserved production system and marketing to support them
There is a shift in from producing a commodity to a 'market or buyer' driven bean that have unique or novel output traits. The value of such traits must return incremental margins to all sectors of the industry. The special quality characteristics for food and industrial use are largely unknown. It is recognized that edible beans contain some unique starch, protein and fiber characteristics. Health professionals have recognized the value of edible beans for their health benefits. However only a few researchers have studied pulse utilzation for food and industrial uses. Little is known of the compositional traits that may be of special value.

Current Research/Extension Activities
Work at AAFC, Harrow and University of Guelph has focused on developing, and evaluating germplasm and varieties for canning quality. Efforts have also been directed to factors that have an influence on flatulence, and altered sugar content and quality. Ongoing research is working on expanding the germplasm base.

2. Evaluation/development of alternative pulses, specialty market types.

Target Agency: AAFC, U of Guelph, Pulse Canada, OMAF, ARIO, CARC,

Title: Expand present research funding of alternative pulses to also include niche market types currently being grown on a limited number of acres in Ontario.

Details:

- Continue to fund research into mung beans and pigeon peas. Both crops show promise as niche pulse crops with high value.
- Expand breeding/agronomic research to include other niche pulses grown in Ontario. Examples include Kintoki, Otebo, Large white.

Background

Acreage of several niche market classes of dry beans including adzuki, otebo, kintoki has expanded in Ont. AAFC, Harrow has developed varieties of Mung Beans and pigeonpeas suitable for Ontario. Several other market classes grown on limited acres offer new market opportunities. However no breeding/ agronomic research into expanding the market opportunities of these high value pulses is being done. Good demand for these market types exists both domestically and internationally.

ONTARIO TOBACCO COMMITTEE

1. Improving crop quality

1) Development of high quality cultivars with:

a) Good manageability, balanced leaf chemistry, mature leaf style, and less off-grades.
b) Resistance to pests and diseases (root lesion nematode, black root rot, blue mold, curing disorders (bacterial soft rot, pole rot, aspergillus), target spot, rhizoctonia, tobacco mosaic virus (TMV), aphids, and sclerotinia.
c) Suitable for machine harvest. Traits to consider are: uniform leaf maturity, leaf suitability for machine harvesting, and reduced sucker
d) High return and yield (farm yield and lamina yield)

2) Effects of different nitrogen rates and varieties on tobacco yield and quality (CTRF) (short term research priority, ongoing project)

3) Identify the cause(s) and solution(s) of tobacco bruising (CTRF) (long term research priority, ongoing project)

Quality Assurance Priorities

1) Leaf quality (CTRF) (ongoing project)
2) Analysis of green and cured tobacco leaves for the presence of blue mold oospores (CTRF) (ongoing project).
3) Further development of measures to reduce TSNA's in cured tobacco. (CTRF)

SERVICE PRIORITIES

Service priority 1: Extension and information validation

Background: As new technologies become available, information about these technologies must be disseminated throughout the sector. These technologies must also be assessed for wide area adaptability, or specific geography or situations were they perform to the benefit of the user. Without this extension and validation of new technologies, advancements may never be accepted by the industry, or uptake may be slowed dramatically.

While extension efforts are often assumed to be intrinsic within the development of new technologies, this is rarely the case. Many research personnel are simply too busy to make this occur, or lack the network to promote the technology effectively. It is essential that this extension link exist, both to speed uptake and to make the research community aware of new and emerging problems and opportunities.

Economic importance: promoting uptake of the best new innovations ensures rapid acceptance and adoption of these technologies. This ensures that the full value of new enhancements is realized. Extension services are considered "GATT green", indicating that all countries accept the tremendous value that extension efforts have.

ONTARIO OIL AND PROTEIN SEED CROP COMMITTEE

1. Publication and Distribution of Educational Material

Issue: One of the most efficient ways of transmitting information to producers is through educational material either through printed publications or the Internet.

Background: In the past information was primarily distributed through printed publications. Although this continues to be the primary means of getting information to producers the World Wide Web has become increasingly important. The following list of publications are key sources of new information to Ontario producers.

a) Printed publications such as The Ontario Soybean Variety Trials Report
b) Web based information such as The OOPSCC web page, the OMAF web page and the Plant Health Initiative
c) Extension publications such as regular newsletters.

2. Field Scale Validation/Demonstration Trials

Issue: As new pests emerge pertinent information must be communicated to stakeholders.

Background: As new and emerging pests become a significant production issue in Ontario producers must be made aware of the biology and best management practices to control these pests. For example although these insects are relatively new they have quickly become a major economic concern to growers. Best management practices must be conducted "in the field" to demonstrate and verify to producers these BMP's. This requires field scale verification/demonstration trials whenever feasible. New technology to address existing production difficulties must also be assessed in the field. The following is a list of the main issues that need to be addressed.

a) Soybean Aphids - foliar insecticide applications
- Insecticide seed treatments

b) Soybean Cyst Nematode
- evaluation of races and site specific variety performance

c) Root Rots (Phytophthora/ Rhizoctonia/Fusarium)
- fungicide seed treatments

3. Educational Conferences

Issue: Conferences are key sources of information for producers and agribusiness.

Background: Although publications distribute information efficiently meetings and conferences are important to explain topics and issues more in depth. They are also vital in educating Agi-business and establishing contacts with industry members. Some of the key meetings in Ontario include the Southwest Ag Conference, Excellence in Soybean Production, Diagnostic Days, Farmsmart etc.

ONTARIO PULSE COMMITTEE

1. Ontario Pulse committee will host the Canadian Pulse Research Workshop, November 2004.
2. IPM for Insects/diseases :
   - Anthracnose was common in white bean fields in 2003. In addition a new race of the disease has been identified in Manitoba. Few white bean varieties carry resistance genes to known strains of anthracnose. In 2003 two new foliar fungicides were registered that control anthracnose. Scouting and management strategies need to be field tested and refined. Samples of infected seed will need to be collected and tested for race identification.
   - Sclerotinia: Lance fungicide received registration for white mould control. Extension of white management strategies for control of white mould is needed.

- SCN is becoming more widespread in dry bean growing regions, with little knowledge of its impact on dry beans, SCN populations, or management strategies.

3. Starter/foliar fertilizer research trials has produced mixed results in research trials, yet growers often report benefits to the practice. In limited trials sponsored by Ontario bean grower associations in 2003, foliar and starter trials resulted in 5% -10% yield improvement. More interestingly pyrachlorstrobin (Headline) which is reported to delay ethylene production , produced similar yield improvement.

4. Dry Bean growers report positive benefits to include 30 to 60 lbs/ ac of nitrogen in fertility programs, although research has not demonstrated the same benefit unless root rot was prevalent. Additional field trials to investigate grower reports are required.

APPENDIX I (a)

ONTARIO CEREAL CROPS COMMITTEE - MAIN

Organization	Representative
OMAFRA	➢ Mr. P. Johnson, Chair
Ridgetown College	➢ Dr. A.E. Smid, Secretary-Treasurer, exofficio
OCCC Production Subcommittee	➢ Dr. G. Hoekstra
Public Plant Breeders	➢ Dr. D.E. Falk
O.W.P.M.B.	➢ Mr. P. Tuinema (C. Sherk, alt.)
OCCC Variety Subcommittee	➢ Mr. A.R. McElroy
C.S.T.A.	➢ Ms. G. Harris (J. Reid, alt.)
O.S.G.A.	➢ Mr. P. Szentimrey (L. Trepanier, alt.)
Commercial Plant Breeders	➢ Mr. L. P. Shugar (T. Welbanks, alt.)
O.S.C.I.A.	➢ Mr. G. Beaudry (S. Ryzebol, alt.)

APPENDIX I (b)

ONTARIO CEREAL CROPS COMMITTEE SUBCOMMITTEE – VARIETY

C.P.B., C.S.T.A.	➢ Mr. A.R. McElroy, Chairman
University of Guelph, O.A.C.	➢ Mr. J. Rowsell, Secretary
Millers' Rep.	➢ Mr. G. R. Carson
K.E.F.	➢ Mr. L. Guillemette
E.C.O.R.C.	➢ Dr. K. M. Ho
Kemptville College	➢ Dr.G. J. Hoekstra
University of Guelph, O.A.C.	➢ Dr. L. A. Hunt
Crop Technology, OMAFRA	➢ Mr. P. Johnson
Crop Technology, OMAFRA	➢ Mr. S. Banks
C.G.C.	➢ Mr. J. Lowe
C.S.G.A.	➢ Mr. M. Mackinnon
University of Guelph, O.A.C.	➢ Dr. D.E. Falk
E.C.O.R.C.	➢ Dr. R. S. Pandeya
Quality Co-ordinator	➢ Dr. L. Pietrzak
O.W.P.M.B.	➢ Mr. P. Tuinema (C. Sherk, alt.)
N.L.A.R.S.	➢ Mr. J. Rowsell
Disease Co-ordinator	➢ Dr. A. Xue
Ridgetown College	➢ Dr. A. E. Smid
C.S.T.A.	➢ Ms. G. Harris (J. Reid, alt.)
O.P.C.R.S.C., O.C.P.C.	➢ To be Appointed

O.S.G.A.	➢ Mr. P. Szentrimrey (L. Trepanier, alt.)
University of Guelph, O.A.C.	➢ Mr. R. A. Upfold
C.P.B., C.S.T.A.	➢ Mr. L.P. Shugar (T. Wellbanks, alt.)
O.S.C.I.A.	➢ Mr. G. Beaudry (Mr. S. Ryzebol, alt.)
Thunder Bay Research Station, OMAFRA	➢ Mr. G. Scheifele
E.C.O.R.C.	➢ Dr. H. Voldeng

APPENDIX I (c)

ONTARIO CEREAL CROPS COMMITTEE - QUALITY, OF THE SUBCOMMITTEE VARIETY

P.R.C.	➢ Dr. L. Pietrzak, Chair
Robin Hood Multifoods	➢ Mr. G. R. Carson
Quaker Oats Co. Ltd.	➢ Mr. M. Morrison
Corporate Foods	➢ Mr. N. Woodbeck
C.G.C.	➢ Mr. J. Lowe
Reid Milling	➢ Mr. M. Mak
O.W.P.M.B.	➢ Mr. P. Tuinema (C. Sherk, alt.)
A.D.M.	➢ Mr. M. Neale
Hayhoe Flour Mills	➢ Mr. M. Hayhoe

APPENDIX I (d)

ONTARIO CEREAL CROPS COMMITTEE SUBCOMMITTEE - PRODUCTION

Kemptville College	➢ Mr. G. J. Hoekstra, Chair
O.M.A.F.R.A.	➢ Mr. S. Banks, Secretary
North West Ontario	➢ Mr. G. Scheifele
C.S.G.A.	➢ Mr. M. MacKinnon
University of Guelph, O.A.C.	➢ Dr. L. A. Hunt
University of Guelph, O.A.C.	➢ Dr. D. Falk
Ag & Rural Division, O.M.A.F.R.A.	➢ Mr. P. Johnson
K.E.F.	➢ Mr. L. Guillemette
E.C.O.R.C.	➢ Dr. A. R. McElroy
E.C.O.R.C.	➢ Dr. T.M. Choo
E.C.O.R.C.	➢ Dr. R. Pandeya
O.W.P.M.B.	➢ Mr. P. Tuinema (C. Sherk, alt.)
N.L.A.R.S. (O.S.M.R.S.C.)	➢ Mr. J. Rowsell
C.S.T.A.	➢ Ms. G. Harris (J. Reid, alt.)
E.C.O.R.C.	➢ Dr. A. Xue
E.C.O.R.C.	➢ Dr. H. Voldeng

Ridgetown College	➢ Dr. A. E. Smid
O.S.G.A.	➢ Mr. P. Szentimrey (L. Trepanier, alt.)
University of Guelph, O.A.C.	➢ Mr. R. A. Upfold
C.P.B., C.S.T.A.	➢ Mr. L.P. Shugar (T. Wellbanks, alt.)
O.S.C.I.A.	➢ Mr. G. Beaudry (Mr. S. Ryzebol, alt.)
C & M Seeds	➢ Ms. E. Sparry
W.G. Thompson & Sons Limited	➢ Mr. M. Etienne
O.P.C.R.S.C., O.C.P.C.	➢ To be appointed

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Group Identifiers:
VSC - Variety Subcommittee members
ROC - Rest of Committee (additional main committee members)
CSS - Canadian Seed Sponsors
CSC - Canola Seed Committee
CANO - Canadian Organisations
USAO - USA Organizations

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MEMBERSHIP OF CENTRAL AND SUB-COMMITTEES, 2003

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Mr. Joel Bagg (P)	Secretary (01-04)	OMAF
Bob Dippel (P)		CSTA
Mr. Bruce Whale (P)		OFC
John Kinghorn (V)		OSCIA
Mr. Jay Hackney (V)		Comm. Plant Breeders
Mr. Chris Gillard (V)		Ridgetown College-UG
TBA (P)		

Production Sub-Committee

Mr. Joel Bagg	(Chair 02-04)	OMAF
Ms. Wendy Asbil	Acting Sec. 03-04	Kemptville College-UG
Mr. Jack Kyle		OMAF
Dr. E. Ann Clark		Crop Science, UG
Mr. John McGill		CSGA
Mr. Murray Cochrane		OSCIA
Mr. Bob Dippel		CSTA
TBA (alt)		CSTA
Mr. Bruce Whale		OFC
Mr. Lloyd Kuhl		OCA
TBA		DFO
TBA (if needed)		Environmental

Variety Sub-Committee

Mr. Matt Bowman	Chair 03-06	New Liskeard R.S -UG
Mr. John Madill	Secretary	(non voting)
Dr. Steve Bowley		Plant Agr. U. of G.
Mr. Chris Gillard		Ridgetown College-UG
TBA		Kemptville College-UG
Mr. Joel Bagg		OMAF
Mr. John Kinghorn		OSCIA
Mr. Tim Welbanks		CSTA
Mr. Jay Hackney		Commercial Plant Breeders
Mr. Barton MacLean		OFC
Ms. Sher Bushell (observer)		Variety Reg'n, CFIA

OFCC CENTRAL COMMITTEE MEMBERSHIP- 2003

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